ELECTRICAL TIMES

THURSDAY
8 JUNE
1950
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The inherently sound design of 'English Electric' House Service Meters guarantees sustained accuracy for long periods of installation.

Calibration is simple: dimensions are standardised and 'English Electric' meters are "Long Range" to B.S.S.37-1937 and are 'approved'.

The ENGLISH ELECTRIC Company Limited
INSTRUMENT WORKS - - - - STAFFORD

See also "English Electric" Fusegear advertisement, page 16

COOKING IN CRAMPED QUARTERS?

The ready-made solution

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MADE BY THE HOUSE OF Simplex

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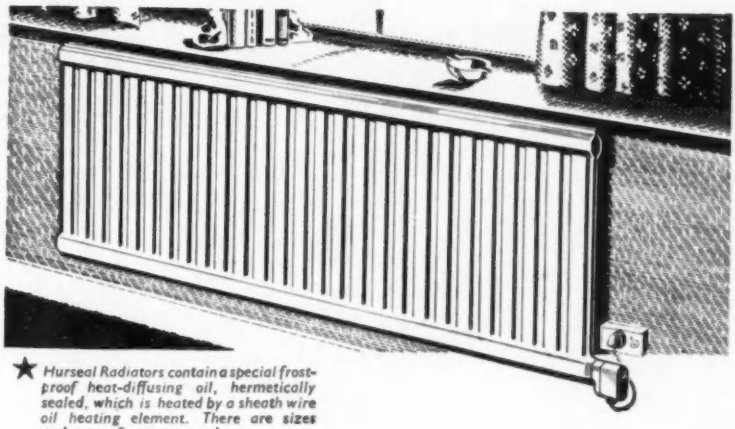
This unit is a complete central heating system - by electricity★



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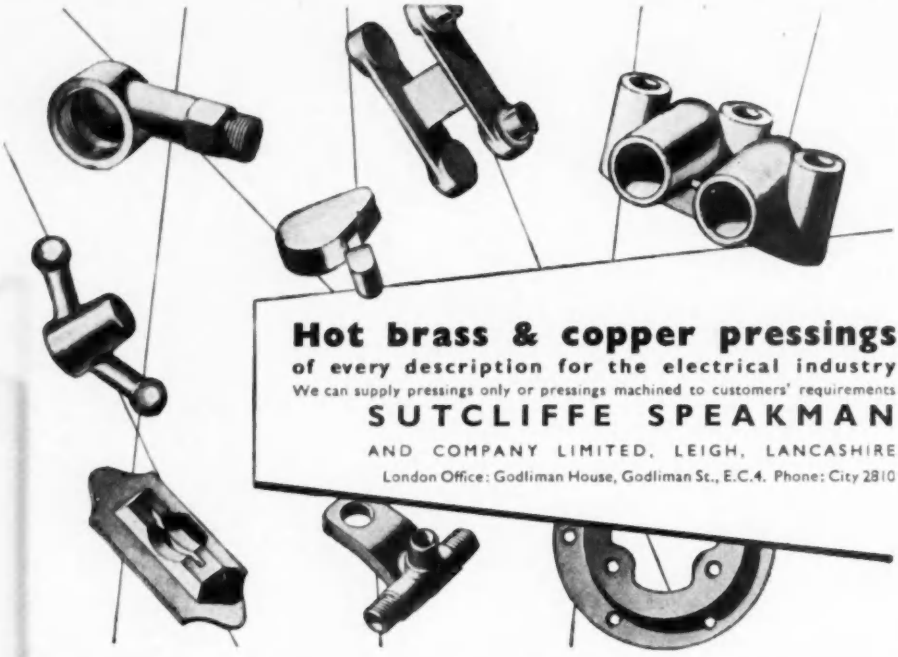

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1912

1950

Works at Derby Road with extension (3 front bays) completed

The Story of BELLING *& Company Ltd.* No. 6

The last chapter brought us to March 1915 and our Balance Sheet at that date. During the remainder of 1915 we took on much more war work, mainly heating and cooking equipment for submarines, glue pots, metal pots and many similar appliances for factories on war work; also a number of large baking and steaming ovens for Canteens.

By this time we had of course commenced a considerable amount of production work, instead of buying in and assembling. We also installed our own nickel plating plant to save delays. This was the first actual "process" we started.

It was during this year I took out my first patent on combined "griller-boilers." As everyone in the cooker trade knows, these are now used practically universally, and I feel a large amount of credit is due to us for starting the idea.

On looking through our 1915/16 catalogue, I see we illustrated our first heavy current plug and socket. This we were more or less forced into making, as when sending to see to complaints of our fires "not working" we usually found the trouble was that the wall plug and socket were more or less completely burnt out.

In due course we needed more room, and being on war work we were able to get our extension passed and built very quickly. During this time my office was a wooden shed in the yard, and as a result of damp and draughts I was unfortunately knocked out with double pneumonia for about 6 weeks. The Doctor gave most credit for pulling me through this illness to one of our fires, as it kept the room at a steady, constant temperature. In due course I was able to go down to Brighton to convalesce. Whilst there I met the late Mr. Christie, who was Chief Engineer of the Corporation. They helped us along no end in our early days, and as a matter of fact, ever since. Back at work again I found the extension nearly finished, and our war work which went on during 1916/17 going forward rapidly, and this continued also during 1917/18. The war being over I started on a new catalogue for the winter, 1918/19 which contained a large number of fires and in addition, hotplates, breakfast cookers, immersion heaters, water urns, irons, steamers, grillers, bath water heaters, twin-bar kettles and our very well known "No. 7" boilers. Of this latter we have since sold many hundreds of thousands, and as a very practical appliance it holds its own today—almost as it was. Our electric iron was quite modern too—shaped handle, thumb rest and streamlined body.

The next chapter tells how we were soon swamped out with fire orders again and how we changed back to peacetime production.

C. A. Belling

Belling & Co. Ltd., Bridge Works, Enfield, Middx. Tel.: Howard 1212

CRC6

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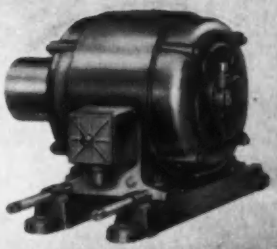
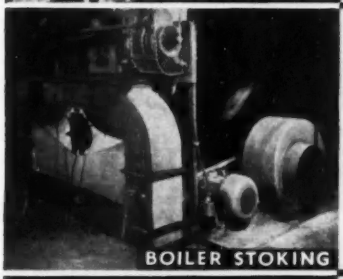
PROTECTED CAGE

The general purpose motor for a thousand jobs where working conditions are normal.

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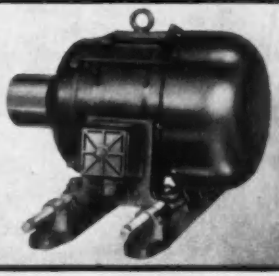
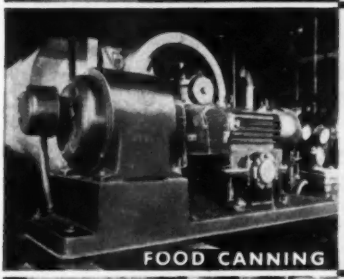
SURFACE COOLED

For the dustier situation it is better to use the Totally Enclosed Surface Cooled type.

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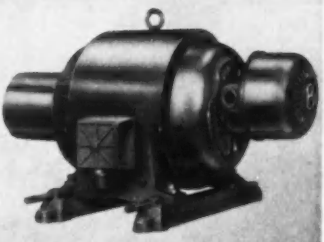
If local starting conditions are severe a Slip Ring motor is a wise choice. Available in Protected and Surface Cooled enclosures.



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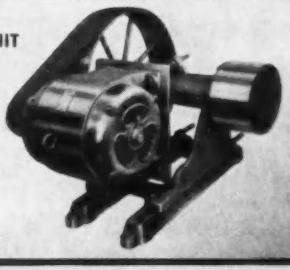
Economical speed reduction from 4-1 can be attained by the installation of the patent Brook Vee Unit.



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overhead low-voltage transmission cable, embodies features which we can justly claim to be abreast of, if not in advance of the times. Not only do we ignore climatic extremes, we know STERLINE has a lower initial cost—is lighter in weight and is easier to handle than the "old" braided and compounded weather-proof aerial wire. Needless to say, we have made and are still making many thousands of miles of the type we now call "old", simply because we stress the importance of pleasing all cable users.

Full details of STERLINE will be sent on request: these will include specification, sizes, weights and prices.

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CABLE COMPANY LIMITED

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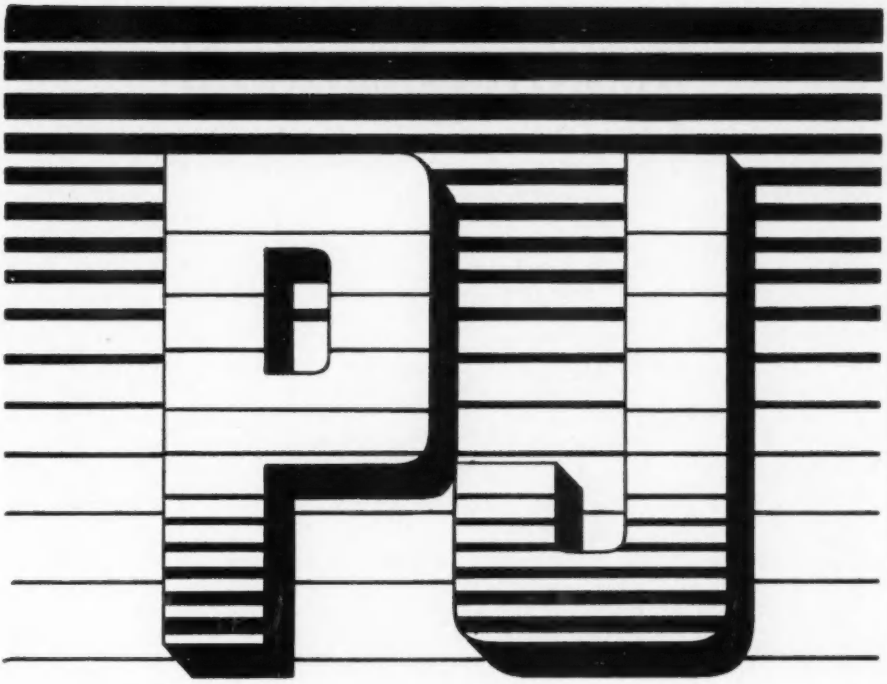

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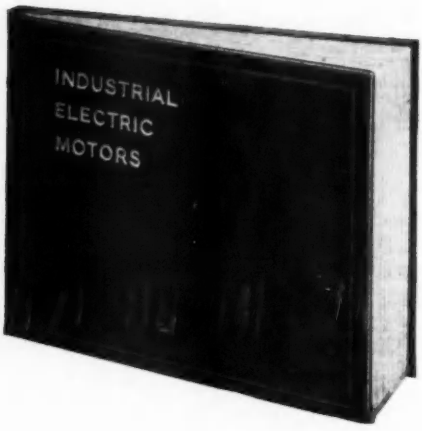

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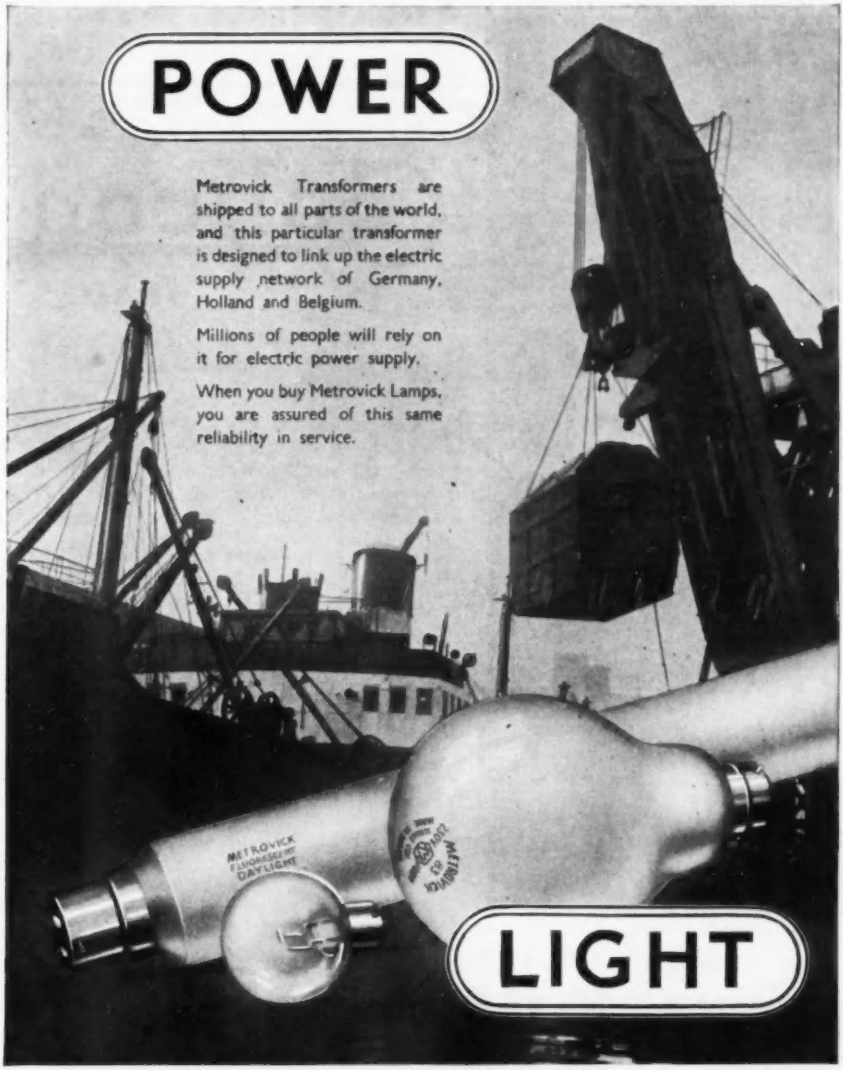
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BENJAMIN

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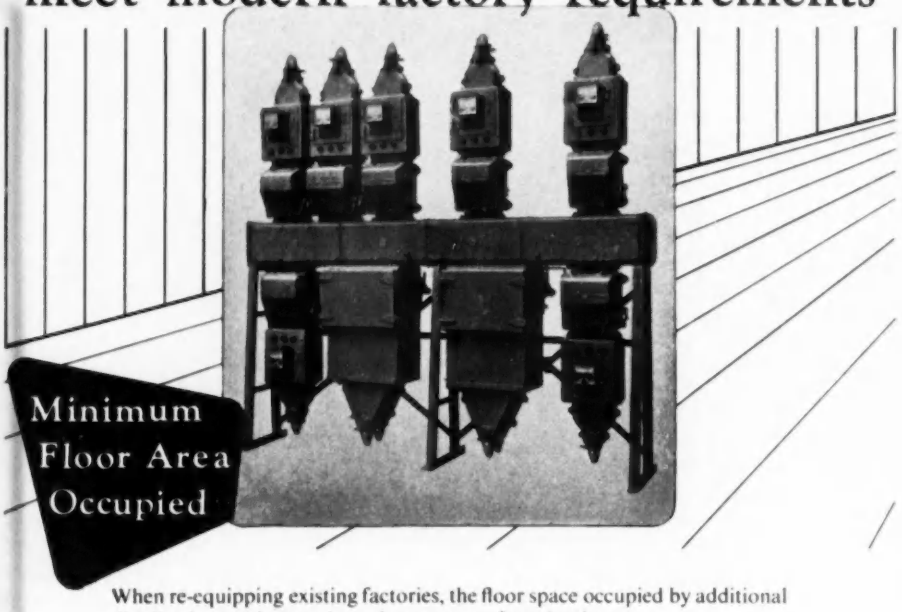
'ENGLISH ELECTRIC'

Combination

Fuse-Switch Boards

meet modern factory requirements



When re-equipping existing factories, the floor space occupied by additional distribution equipment is at the expense of production area.

'English Electric' Combination Fuse-Switch Boards are designed to permit direct-to-wall mounting with all parts accessible from the front, the maximum projection from the wall is only 1' 10".

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See also "English Electric" House Service Meters advertisement on front cover

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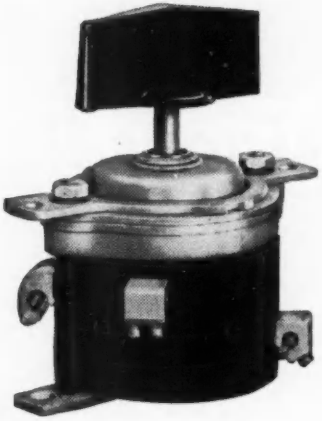

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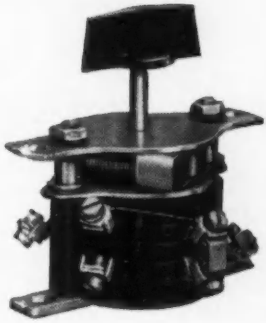

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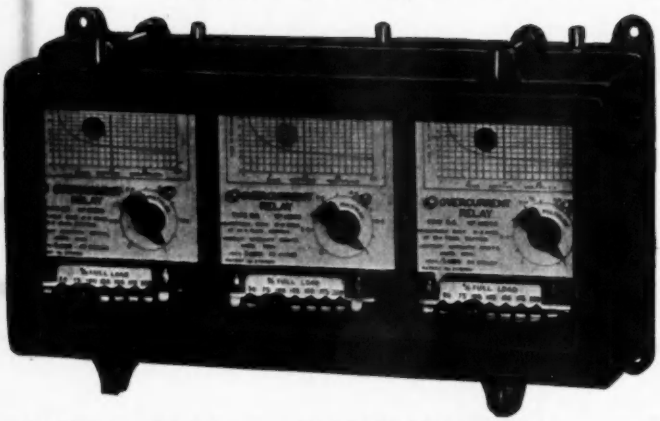

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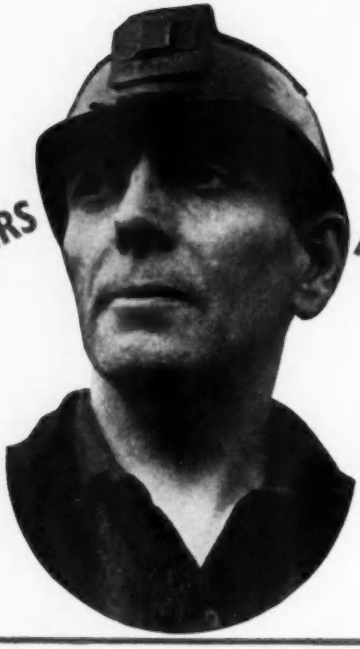

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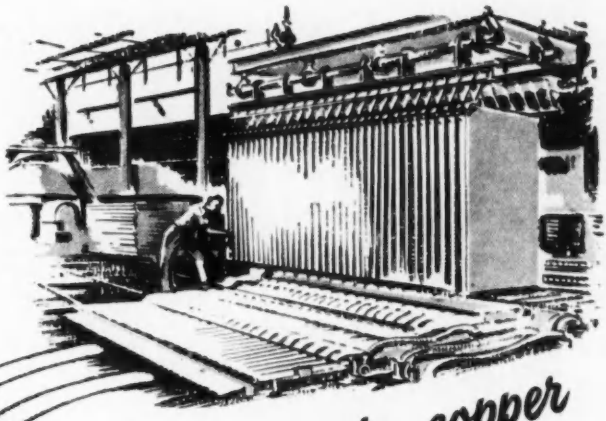

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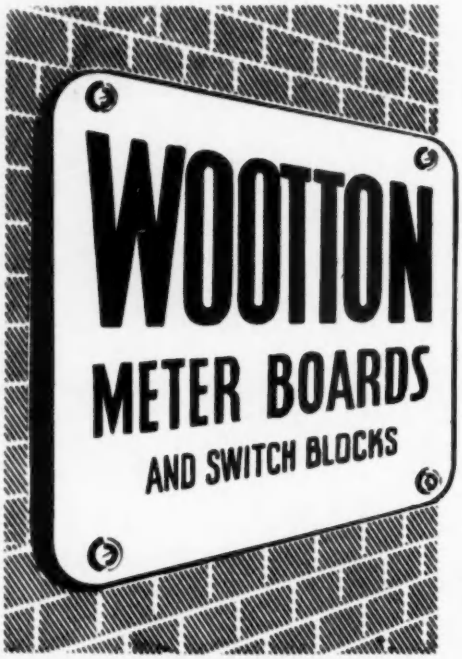

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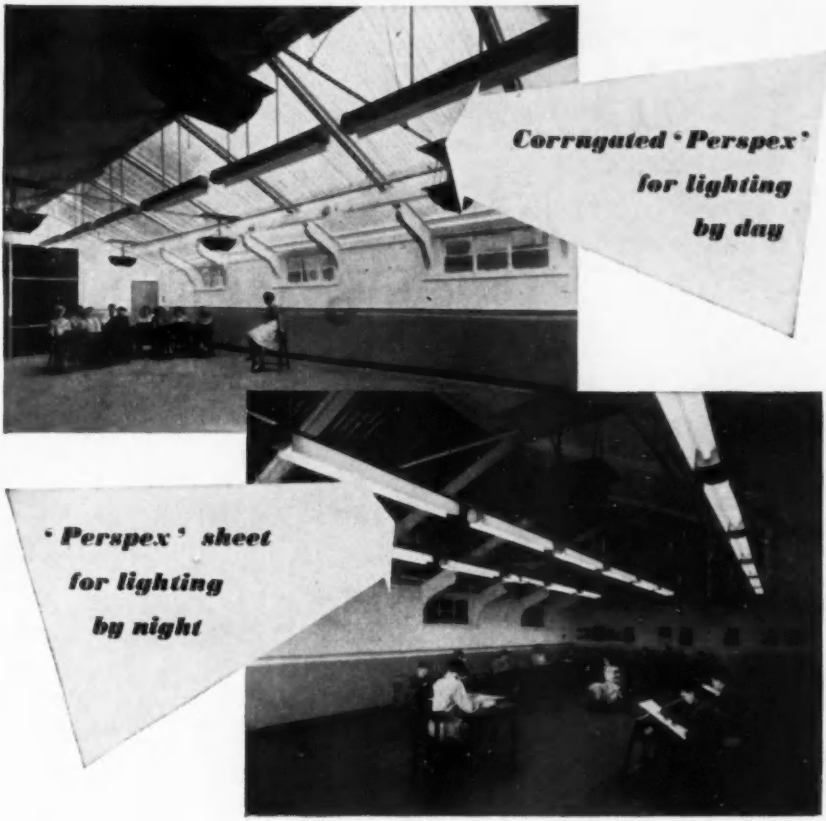

Versatile 'Perspex' acrylic sheet

To make the most of the daylight, more than fifty sheets of corrugated 'Perspex' have been installed on the north side of Manchester Art School's temporary building. At night, Atlas lighting fittings, with 'Perspex' reflectors made by Thorn Electrical Industries Ltd., London, provide efficient, evenly diffused lighting. These two examples of the use of 'Perspex' in the field of lighting are typical of thousands of others found for this versatile material throughout the world.

'Perspex', in corrugated form, or as lighting fittings fabricated from flat sheet, gives a 24-hour lighting service.

'Perspex' is the registered trade mark of the acrylic sheet manufactured by I.C.I.

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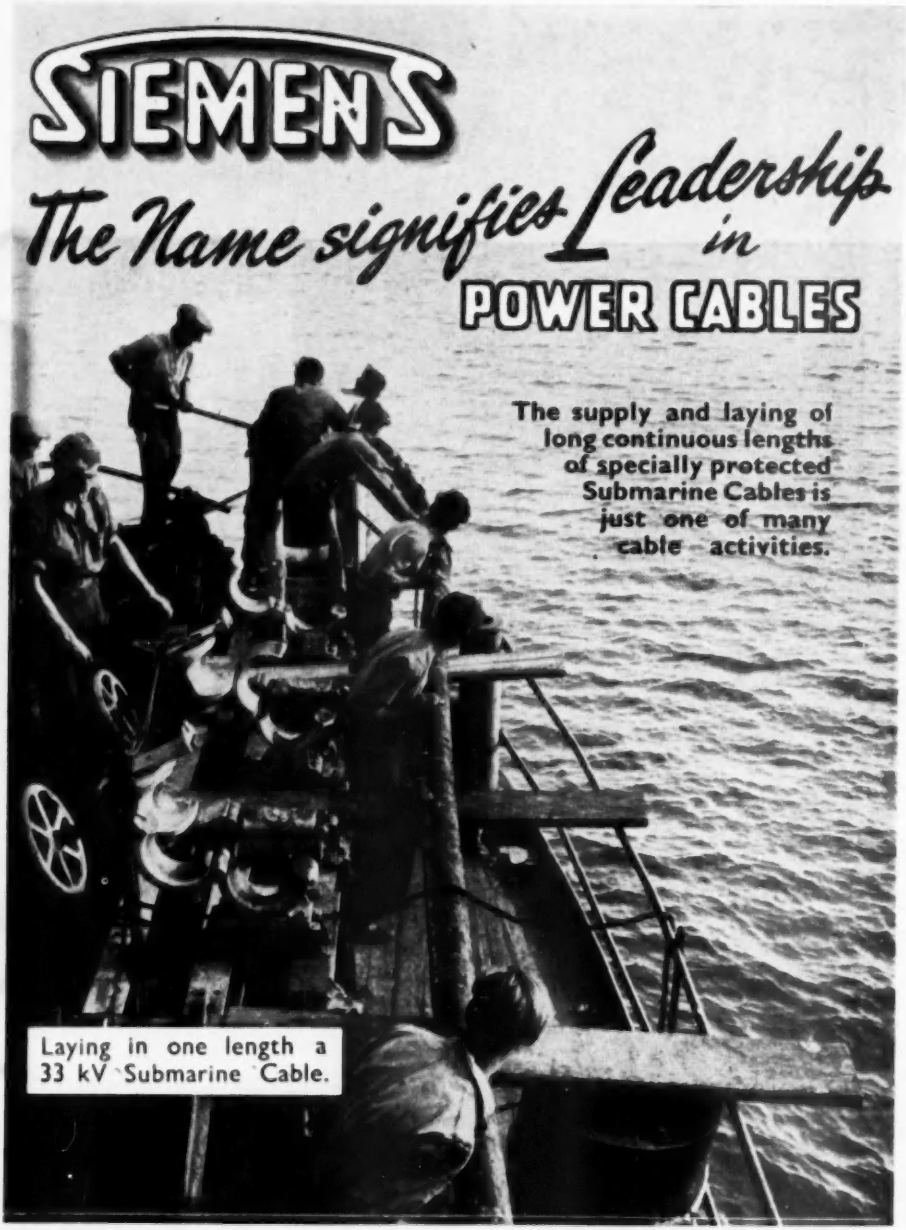
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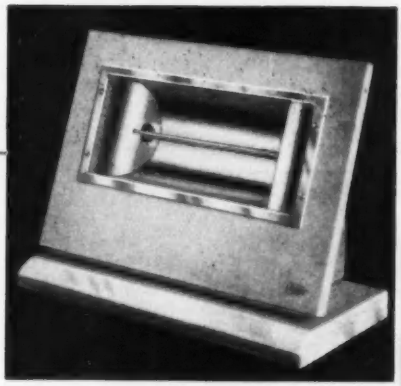

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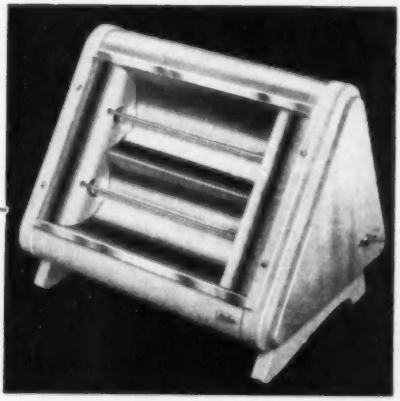

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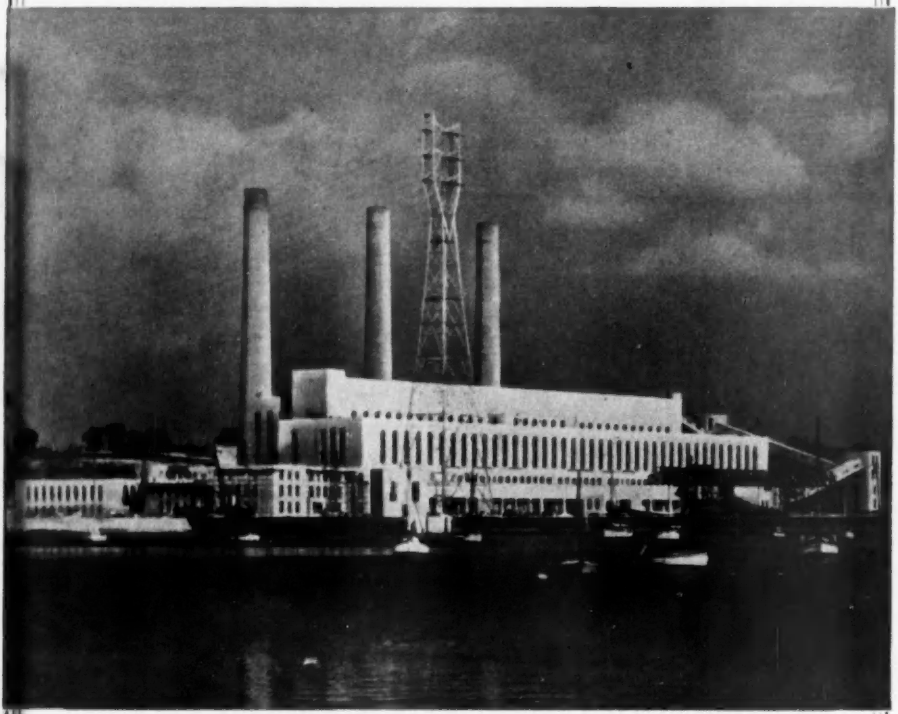

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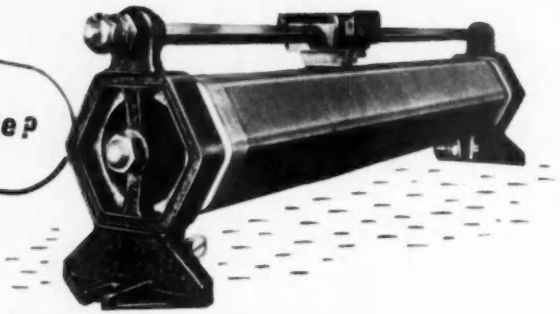

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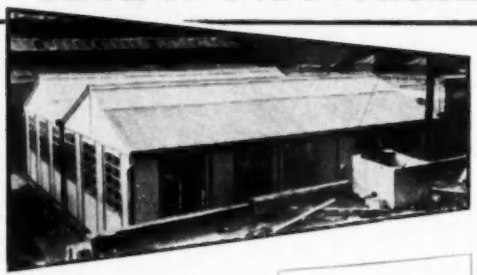

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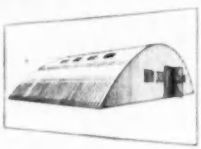

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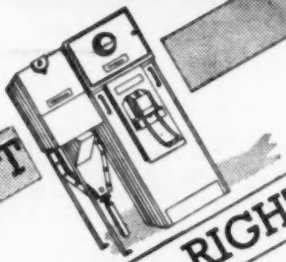
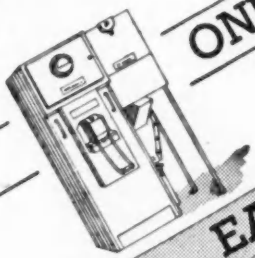
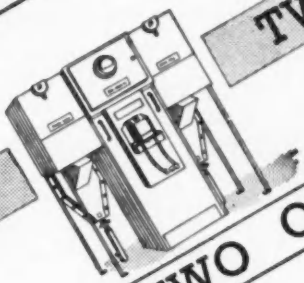


ONE ON THE LEFT

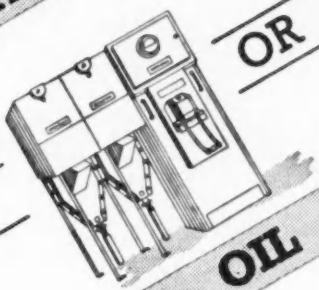
ONE ON THE RIGHT



ONE EACH SIDE



TWO OR TWO ON THE



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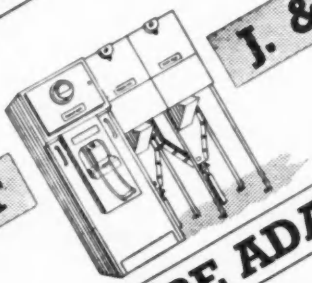

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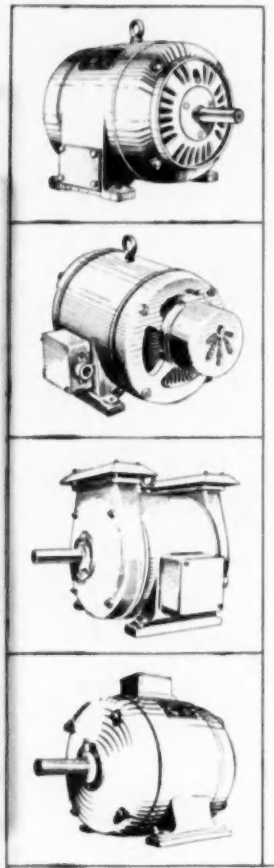

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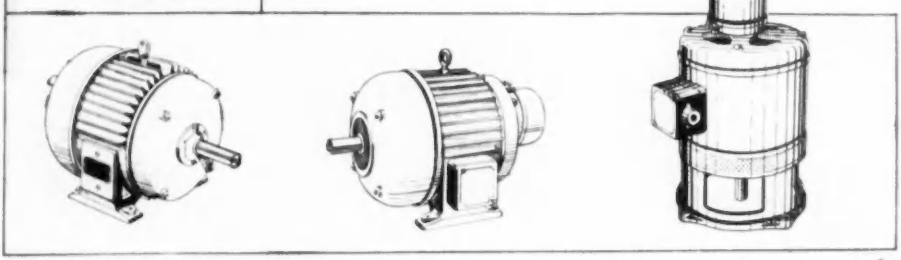

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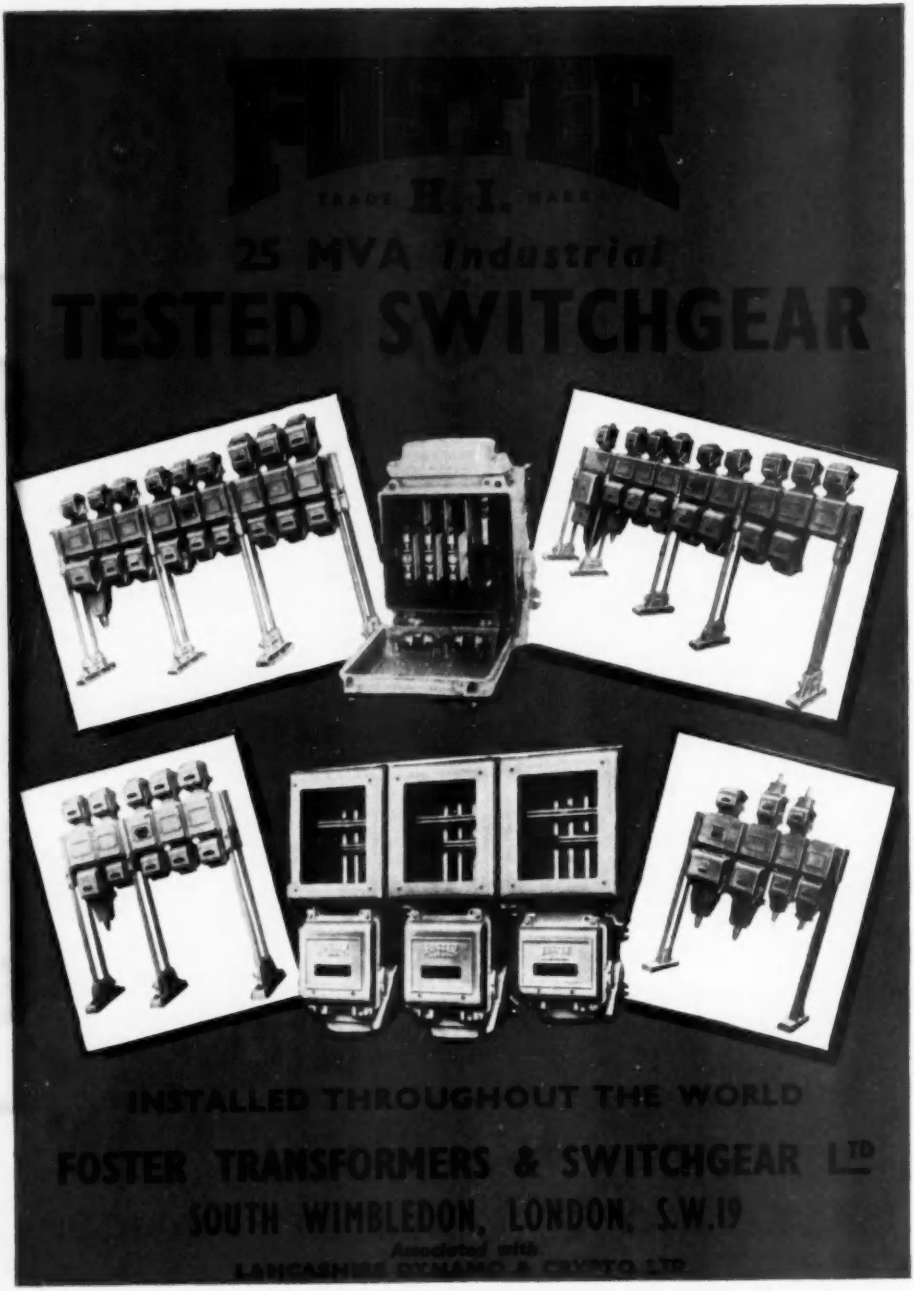
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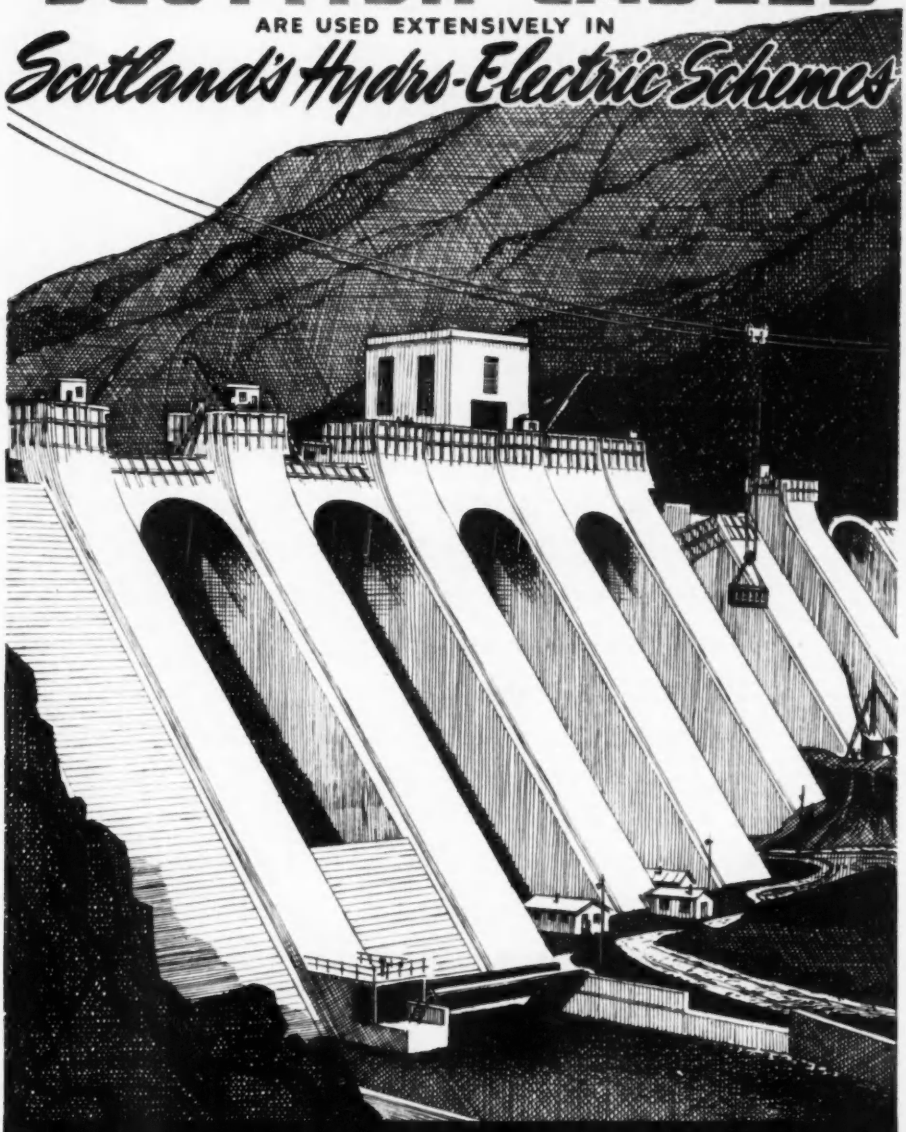

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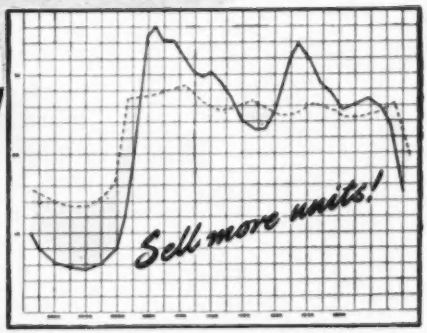
When the committee appointed to consider the matter has reached agreement upon the actual dimensions to be adopted we will make a further announcement.

24th May, 1950

There are more RYTHMATIC Ripple Control installations in Gt. Britain than those of all other systems



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ELECTRICAL TIMES

Vol. 117 No. 3057 THURSDAY, 8 JUNE, 1950

PUBLISHED EVERY THURSDAY

FIFTY-NINTH YEAR OF PUBLICATION

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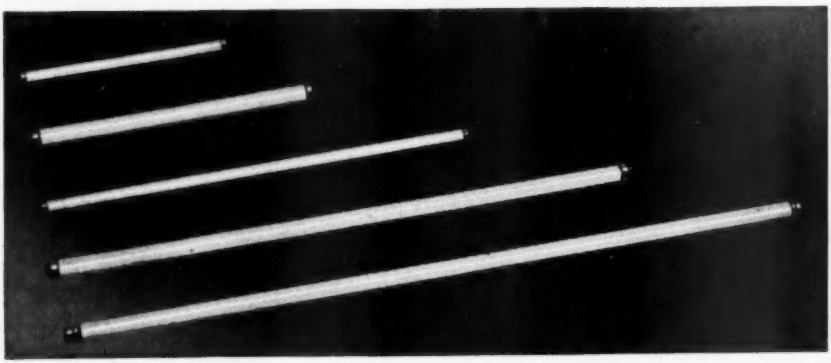

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Editorial

BATTERSEA—BY 2 LENGTHS

HARD on the heels of the traditional Epsom function comes the power station Derby, the annual grading for overall thermal efficiency. This year, as reported elsewhere, Battersea "B" romps home with 28·81%, leading all comers by more than 2%—so far ahead that it can run a three-legged race with Battersea "A" (officially graded sixth, with 25·89%) and still show a combined efficiency of 26·72%. Fulham, last year's winner, takes second place with 26·49%, while Kearsley and Hams Hall tie for third place with 26·36%, Llynfi lying next with 26·09%. It is exceedingly difficult to make any intelligent comparisons with last year's results, since most of the individual stations' efficiency seems to have dropped slightly, with the exception of Battersea, Llynfi, Brimsdown "A", and Kearsley, the latter having made a spectacular jump from eleventh to third place. On the other hand, the average efficiency of the first 20 stations has risen appreciably from 24·96% to 25·56%, and compares very favourably with the average efficiencies of all power stations, which was 21·15% for 1948-49, and 20·86% for 1947-48.

COMPARATIVE EFFICIENCY

IT WOULD be interesting to see how thermal efficiencies in this country compare with those in the U.S. Comparisons, however, are difficult, since U.S. thermal efficiencies are not easily come by, most of the available statistics being tabulated in lb of coal per kWh. Latest information regarding U.S. generation shows that this figure, after having remained fairly steady since 1942 at about 1·3 lb/kWh, was reduced to about 1·23 lb in 1949. This must be compared with the British performance of 1·478 lb/kWh given in the B.E.A. Report for 1948-49, as figures corresponding to the latest thermal efficiency table are not yet available. It is difficult to draw exact conclusions, however, due to lack of information regarding comparative calorific values of British and American fuel. Bearing in mind, however, the amount of old plant of low efficiency we have still in operation, and the low calorific value of the fuel we are using, we can pride ourselves that our station operation is second to none.

"BETTER LIGHT . . ."

STATISTICIANS, and others with far less excuse, have referred so often to the "average man," with his fractional number of children and his "average" consumption of everything from toothpaste to tobacco, that one might almost be forgiven for asking how much light has been thrown on the subject. What is his "average" size in lamps? We refer, of course, to the humble "bulb." Fluorescent lighting has so held the stage for the last few years that one is apt to overlook the fact that the incandescent lamp is still selling nicely, thank you; the domestic market alone accounts for between 35 and 40 millions a year. The "average" bulb is getting bigger. In 1922 it was a comparatively small one of 57 watts which had grown, by 1938, to 68, when its U.S. counterpart was only 63. Today, it is nearly 79 watts and getting quite a big chap, since the figure, although not in itself spectacular, represents a very considerable change-over from the 25- and 40-watt ratings to the larger sizes. Industrialists are using more light in factories; in the domestic field 25 watts is no longer considered adequate for a large bedroom. The pioneer work of bodies like the Light-

ing Service Bureau and the Illuminating Engineering Society is, slowly but surely, producing results.

. . . BUT NOT EVERYWHERE

DESPITE the signs of increasing appreciation of the advantages of good lighting, there are still many situations where the lesson has not been learned. Railway stations in general are not shining examples of the illuminating engineer's art, London Transport, for instance, providing some particularly bad examples. The contrast between the excellent lighting in the trains themselves (where 6-10 foot-candles are shed on one's newspaper), and the gloom of most of the older Tube stations is exceedingly trying. With the exception of the fluorescent lighting at Piccadilly Circus, where the average illumination ranges from 4-8 foot-candles (approx.) over the platform area, the illumination at stations lighted by a line of bulbs strung along the centre line of the tunnel, rarely seems to be more than about 2-3 foot-candles at the platform edge, and is often less than 1f.c. at the rear of the platform—adequate for street lighting, but almost impossible to read by. The poor illumination seems to be due to the position of the lamps as much as anything. It is difficult to see why lamps should be located in the centre of the tunnel rather than over the platform itself, and one can only suspect that it is done to let the posters on the opposite wall get their share. If lamps were located above the platform at a lower height, at least four times the illumination could be obtained for the same energy expenditure.

SITUATIONS OVERSEAS

THE INTERCHANGE of engineers between this country and the Dominions has always been a valuable feature of Commonwealth relations, and many men who have received their technical training over here, are now filling important posts overseas. The inevitable trend towards self-sufficiency in technical manpower, as in other fields, in the Dominions has led to some diminution of opportunity in recent years. Nevertheless, our advertising pages show that there is still scope for our engineers overseas. This week we publish an advertisement for the engineering staff in connection with the vast Australian hydro-electric project in the Snowy Mountains. The positions range from that of chief engineer downwards, and although the salaries offered are not unduly attractive, there will, no doubt, be many who will wish to be associated with this great h.e. scheme.

Meteor

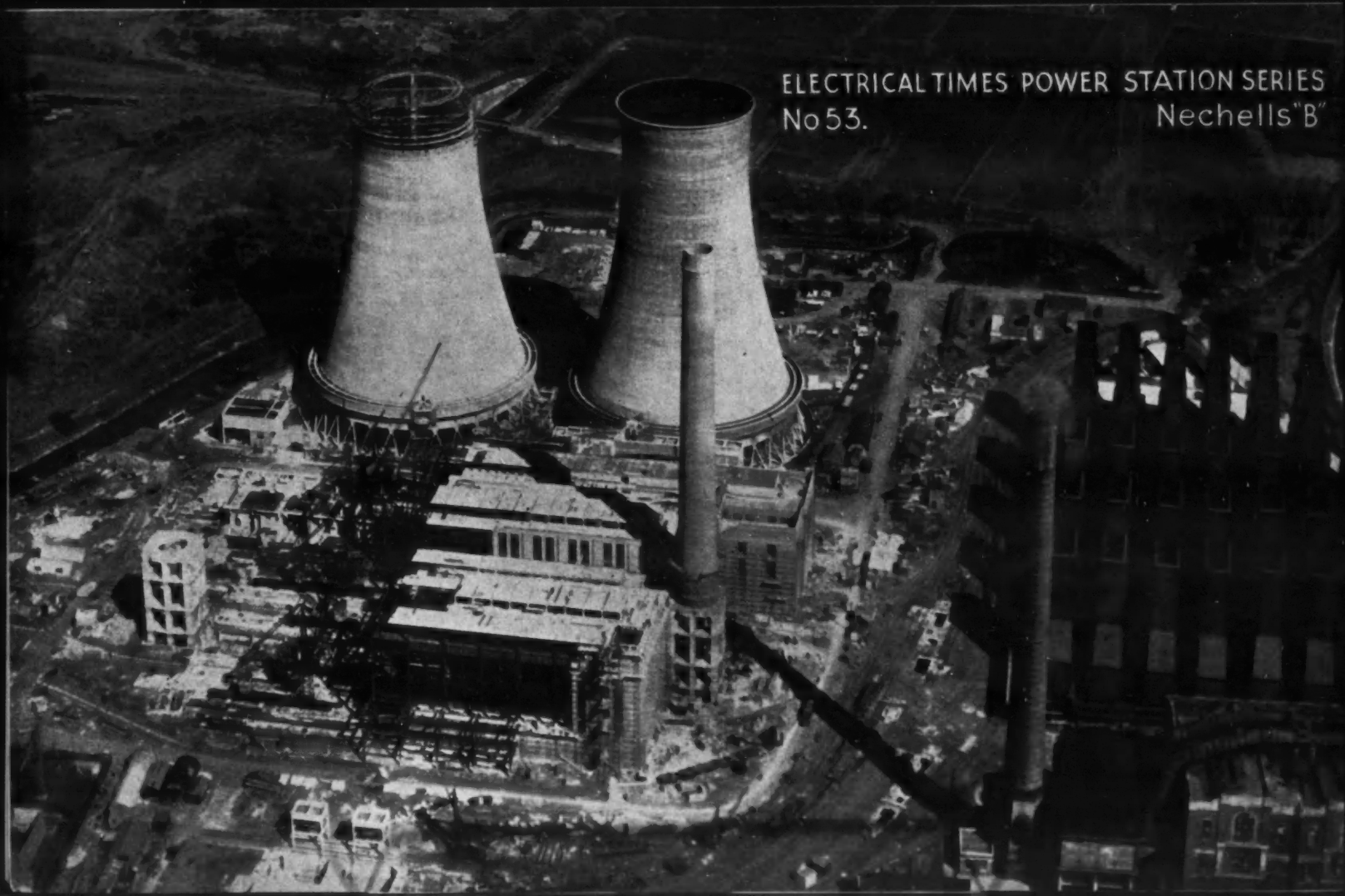
THIS WEEK'S PHOTO

INITIATED by the City of Birmingham Electric Supply Department, and now one of the generating stations under construction in the Midlands Division of the British Electricity Authority, the new Nechells "B" generating station will eventually supersede the existing Prince's station, part of which is seen on the right-hand side of the photograph. The site for the Prince's station was acquired in 1912, but owing to World War I construction work on the station was abandoned and was not resumed until 1918. The station was opened by Edward, Prince of Wales, in 1923, and completed in 1929 with a total plant capacity of 156 MW.

Nechells "B" will ultimately house four 50 MW Parsons 3,000 r.p.m. turbo-alternator sets generating at 11 kV and 12 International Combustion Ltd. stoker-fired boilers of 230 k lb./hr. capacity. Steam conditions at the turbine stop valve will be 650 p.s.i. at 825° F. The boilers have been designed to burn a mixture of low-grade coal and coke dust from the nearby Gas Works it being estimated that by burning about 20% coke dust the generating costs will be substantially reduced. The coal-handling plant will be so arranged that coal or coke delivered to the station by rail, road or canal can be discharged to the bunkers or to the coal store and alternatively reclaimed from the store for delivery to the bunkers.

The turbo-generators will be arranged in line and flanking the turbine house on the one side is the circulating water pump bay, while on the opposite side is the boiler house to accommodate a double row of boilers. The boilers will be arranged in back-to-back formation with the fan bay, housing the forced and induced draught plant, in between the two rows of boilers. There will ultimately be three ferro-concrete cooling towers. The pump house shown at the base of the tower adjacent to the river will provide river water for circulating water make-up to the towers.

Main 11-kV switchgear now in use in Prince's station will be used for the first two turbo-alternators at the new station, but for the second two sets new switchgear will later be provided. When Prince's station is closed down the cooling towers will be demolished to provide ground for the coal store of the new station. The first section of the new plant is due for commissioning next year.


ELECTRICAL TIMES POWER STATION SERIES
No 53.
Nechells "B"

Our readers' views . . .

The Art of Delegation

AS Mr. Rawll states in his article published in your May 18 issue, delegation is an art, but its exercise involves the following basic essentials which cannot be overstressed.

Firstly, that the staff to whom the work is to be delegated is adequate in number, and properly organised to handle it. Secondly, that this staff is of a sufficiently high standard of knowledge and experience, and competent to deal with matters referred to it. This implies that adequate salaries must be paid to attract and retain the right staff.

Finally that the senior official always retains control and interest in the work delegated and is always willing and anxious to help and advise his staff in matters referred to them.

It is the responsibility of the delegating official to ensure that these pre-requisites are met, otherwise the delegation merely deteriorates into another example of "passing the buck." This soon becomes a vicious spiral, as keen and efficient staff, finding themselves continually carrying more than their fair share of work and responsibility, are compelled, in self defence, to follow suit. Efficiency and enthusiasm thus become submerged in a welter of "passed to you—Sir !"

LONDON E. *"Delegatee"*

◆ ◆ ◆

Radiant Hotplates

I AM contemplating the purchase of a new electric cooker and would like your readers' opinions on the desirability, or otherwise, of installing radiant plates.

These are sometimes offered as an optional extra on the large boiling plate, but it seems to me if one accepts the radiant plate as economic it should be fitted to both boiling plates and to the grill boiler. The advantages appear to be more rapid heating and cooling, with consequent greater efficiency, light aluminium utensils being satisfactory and finer automatic control being possible; as against this, there is the additional first cost and some doubt as to the mechanical reliability of this type of element.

I have been told it is possible to keep milk just bubbling on a simmerstat-controlled radiant plate, but, on the other hand, I have not yet met anyone who has experience of a radiant grill boiler.

HERTS. *J. G. Brookman*

Unsafe Illuminations

AS the season is approaching when hordes of workmen will descend on to many seaside resorts, to erect the equipment for the autumn illuminations, it would be interesting and probably enlightening to know which regulations, if any, govern these matters.

Hundreds of square feet of sheet metal, are used for set pieces, in situations where they can easily be touched by the public, and small flood lights are put into flower beds, etc., without the least thought of putting an earth wire on to them.

Miles of v.i.r. cable are run without any protection, laid on the ground through stones and long grass, in places to which the public have no access, but which are only protected by a low wood railing which can easily be climbed by inquisitive children. At one resort last year a child received a severe shock from one of these illuminations. A Corporation Entertainment Dept. official who went to investigate the matter received a shock and was taken to hospital. Fortunately he recovered.

The condition of many of the fittings and the type of wiring would not be tolerated by a supply authority on a consumer's premises under the most urgent, emergency condition.

One can quite see that when the corporation was both the consumer and the supply authority, a blind eye could be turned to many of these matters, but what of the position now that the corporation erecting these illuminations will be a consumer only?

"Observer"

◆ ◆ ◆

False Security

SURELY the experiences of "Chartered Electrical Engineer" and J. W. Barber, uncommon as they may be, go to emphasise the fact that certain I.E.E. Regulations should be made law.

If trouble had developed on an appliance connected to one of the points in question, with serious or even fatal consequences to the consumer, I presume no action could be taken against the contractor who fitted the plugs because, in fact, he "supplied and fitted a 3-pin switch-plug."

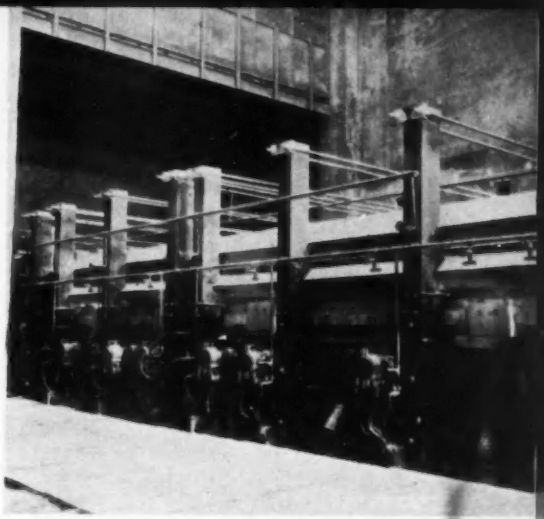
FARNBOROUGH, KENT. *E. J. White*

8 JUNE, 1950

Glass Melting by Electricity

A review of some of the work which has been carried out on this problem

By B. M. PEARSON



Electric furnace at the Romont Works, Switzerland (Courtesy Glass Technical Services Ltd.)

BEFORE considering the newly developing techniques of melting glass by electricity, it will be useful to say a few words first over the general industrial methods for melting glass on the large scale.

Glass for subsequent working, such as glass bottle manufacture or flat window glass manufacture, is melted continuously in bulk, in what are called tank melting furnaces. These consist of a rectangular shaped furnace, the walls of which are made up by large fireclay refractory blocks, held in position on the outside by vertical iron girder buckstays and horizontal tie rods. The roof of the furnace is made of silica brick, and is in the form of a sprung, self supporting arch. At one end of the furnace is an opening for charging in the raw materials to be melted to form the vitreous glass (the raw material mixture is called the batch). At the other end of the furnace, which is called the working end, the molten glass is ready for working and fashioning; at this point are placed the automatic glass bottle blowing machines or the flat glass drawing machines. These tank furnaces are, in modern glassworks, of considerable dimensions; a normal glass bottle melting furnace will hold on an average 150 to 200 tons of glass in the furnace and a window glass furnace will hold anything up to 2,000 tons. As the glass is taken out of the furnace at the working end, so a fresh batch is steadily fed in at the other end and the glass level in the furnace is always maintained constant in this manner. A glass bottle furnace will have a glass level of 2-3 ft depth and a window glass furnace is usually run at a deeper glass level of from 4 to 5 ft. The furnace is divided about two-thirds along its length from the charging end by what is termed the bridge; this is a refractory wall projecting above the glass level and having one or more openings in it, below the glass level. Its object is to hold back any unmelted batch floating on the glass surface that has progressed up the furnace and to allow, at a level below the surface, molten glass to flow from the melting compartment into the final working compartment and so ensure a flow of clean, well melted uncontaminated glass to the machines.

These melting furnaces are usually fired by hot producer gas; the gas and air are introduced into the furnace at one side, and the flame passes across the furnace, over the surface of the glass, and leaves on the other side of the furnace. Regenerators are arranged on each side of the furnace for the gas and air and the furnace is reversed periodically every half hour —this is termed the regenerative melting furnace.

General Considerations

Having remained for many years in the academic stage of technical development, the system of electric melting of glass has recently entered into the field of commercial exploitation. The system which has been developed is based on the principle of the electrical conductivity of glass at a high temperature. This conductivity is sufficient to utilise the glass itself as a heating resistor, in a tank melting furnace such as has been described, for example.

The electrodes for supplying the current to the glass may be made either of pure iron or of graphite; they are protected from oxidation at high temperature by being immersed in the glass. To protect them from excessive heating, arising from too high a current density, they

are usually located in an enlargement of the furnace, which serves to separate them from the actual hotter melting zone proper.

This system of electric heating is, naturally, more expensive than the employment of the normal system coal/gas producer layout for melting and the installations that are actually working at the moment, in Continental Europe, are generally located in countries where there is abundant cheap electricity available from hydro-electric plants, or else at any rate, in those parts of these European countries, near to a hydro-electric generating station.

As mentioned above, the melting of glass by electricity is accomplished by passing an electric current through the glass, which serves to heat it, by means of the Joule Effect. When solid at ordinary temperatures, glass is of course an excellent insulating material. However, glass is an electrolyte, whose ionic conductivity becomes evident when the temperature is raised to the softening point, while at a temperature of 1,250° C., ordinary (soda-lime bottle glass) has an electrical resistivity of about 5 ohms per cm. which is diminished by half when the temperature is raised to 1,500° C. It is a fortunate coincidence, that glass at its melting temperature has a resistivity of an order which permits the use of ordinary industrial voltages.

Most of the early efforts of electric glass melting, failed because the electrodes contaminated the glass in an undesirable manner, either from the unsuitable nature of the electrode material or the unsatisfactory method of introducing electrodes into contact with the molten glass. Furnaces in which these difficulties had been partly overcome, were however operated in Norway and Sweden as long as 20 years ago and these early attempts and a large-scale works trial in England in 1929 were described in detail by Meigh.[1]

First Real Technical Progress

Little real progress was made until 1936 when a Swiss electrical engineer (E. V. Borel) seeking an industrial outlet for the surplus electric energy of the Fribourg Electricity Supply Company, thought of glass melting as a promising objective. Fortunately, Borel, as an electrical engineer, did not hesitate to venture into a field where the glass technician would have trodden with trepidation, for he used electrodes made of graphite, which a glass technologist would have been convinced was a somewhat risky innovation.

These graphite electrodes were in the form of cylindrical rods, and were disposed horizontally across the furnace, a few inches below the surface of the glass and perpendicularly to the direction of flow of the raw materials. In practice, the flow was found to be checked by the "thermal barrier" set up by the electrode and the raw materials were thus constrained to remain for some time in the hot zone, covering the electrode. An ingenious, electro-technical arrangement enables three-phase current to be properly balanced. The electrodes pass through the refractory walls of the furnace, protected by water-cooled or air-cooled metal sheaths, and replacement is thus fairly simple, although from experience it has been found that they wear very slowly and the glass technologist's fear of carbon as an electrode material has proved to be groundless.

The S.A. Electroverre Romont[2] was formed to exploit Borel's invention and by 1938 was producing commercial window glass, melted electrically, using the well-known Fourcault automatic flat glass, window glass drawing machines. The quality of the glass made at Romont in 1938 was not high, and the thermal efficiency was low, 4 kWh of energy being consumed in melting each kg. of glass, but the cost of electricity was negligible and the technical advantages were attractive, so that development of the process was continued.

It was during the war years, however, that a very considerable advance was made in electric glass melting installations. Particularly in occupied France, coal became almost unobtainable and any actual economical efficiency of a production process became secondary, so long as some means could be used to maintain production. In the case of the glass industry, electric melting provided the war time answer. Electric melting of glass as an auxiliary fuel, found widespread use in foreign countries during the last war, as one means of increasing the production of glass, as well as overcoming difficulties with fuels that were used prior to the outbreak of the war.

In France, the famous glass concern, Compagnie de Saint Gobain operated about 70 glass melting furnaces, utilising electric glass melting systems. In all these cases, the conventional glass-melting equipment was adapted to electric melting, and the production rate was reported to have increased appreciably; in some cases, increases in production as much as 100 per cent. were reported. In America, electric melting operations have been comparatively uncommon until recently, and generally were located near sources of cheap electric power. Recent trends, however, indicate that electric melting may be used for the specific objective of producing desirable glass at high rates.

Development work along these lines has progressed rapidly, and results indicate that glass can be produced, in some cases, about five times as fast as with conventional fuel melting. This high rate of production may offset the higher cost of electric power in some areas in order to gain other advantages from a production standpoint.

Electric Glass Melting as Auxiliary

In the above survey, electric glass melting has been considered from the aspect of firing the glass furnace with an electric current. As explained, unless electric current is very cheap, as in Scandinavia or Switzerland for example, the process becomes uneconomic, even with the technical advantages that electric glass melting systems have to offer. For instance, electric glass melting has not yet been adopted commercially in this country.

However, technical development has shown that electric current glass melting can be adopted with great success and with considerable commercial advantage over part of the glass furnace and arranging for the first stage of the melting to be performed with orthodox gas or oil firing.

As seen above, the glass melting furnace is divided into two distinctly separate chambers by the bridge wall. The present trend of development is to concentrate the electric heating in the second stage, where the "refining" of the glass takes place, finally to prepare and condition it for the glassworking machines. Also, as will be seen later, in the case of window flat glass drawing furnaces, the drawing machines, which draw the glass from the furnace as a continuous flat ribbon, some 4-5 ft wide, which is subsequently cut up into smaller separate sheets, are arranged along drawing channels, into which the glass flows from the main melting furnace. Trouble has been experienced in the past, because the machines near the furnace receive the glass at the right temperature for working, but the end ones of a line of 8-10 drawing machines on a large furnace, receive the glass too chilled for working at their proper capacity.

The engineers at the St. Gobain works, who had collaborated during the war and before with the Swiss engineer Borel, found that a combination of electric heating with the normal flame heating, produced a remarkable increase in the output of the furnace. Without making any fundamental structural alterations to the glass furnace, it has been found possible at the St Gobain works to "boost" the maximum output of normal orthodox flame

Control gear for the Romont plant
(Courtesy Glass Technical Services Ltd.)

heating, by anything up to 70 per cent in the case of high-temperature melting glasses.

Thus, as can now be seen, where electric melting of glass is practised as an auxiliary heating system, it can be applied to the furnace in two possible ways. First, it may be used in the melting end of the furnace, i.e. the part where the raw materials are introduced as an adjunct to the gas or oil firing. Secondly, it may be employed at the refining and working end of the furnace and on the drawing channels in the case of flat glass, either again in combination with the normal gas or oil firing, or here even, by itself alone, the furnace at this location being operated solely by electric heating. Commercial examples that are working on the large scale, will be considered, of both these two systems.

What is known as the "cell" method has been adopted in France, for auxiliary electric glass melting systems. Here, the gas or oil is used as usual, in the melting end of the furnace, and the electrodes are introduced into "cells" or special compartments built on to the working end of the furnace, and connected to it by very narrow openings, only a small structural addition being involved to the furnace, with low heat losses.

In this method of electric heating the function of the electric heating is to refine the glass and the function is successfully performed, even although the glass may not be completely fused in the melting end of the furnace; in fact, it is claimed to be unnecessary and undesirable to use sufficient heat to complete the fusion in the melting-end of the furnace, because the refining cell is effective even with a partially melted mass, containing "seeds," "bubbles" and particles of raw materials. The economy

achieved with this method of combined melting is even greater than when electrodes are used in the melting chamber, and increases in output of as much as 140 per cent. have been recorded.

It will be fairly obvious now, that apart from the application of electricity to glass melting practice, the system as now technically developed, embodies a completely radical departure from normal glass melting practice, that has been practised from time immemorial, with very little real fundamental change, except to make the melting furnaces progressively bigger, and more efficient and to line them with better quality refractories. Now, however, the glass technician has a very flexible melting tool to hand, in place of the inflexible system previously available. Before, a separate furnace had to be provided for each type of glass melted. Experiments that have proceeded at the St. Gobain works and which are still in course of development, serve to show that a standard glass may be melted in a large furnace and a multiplicity of electrically heated cells may be used for fining and homogenising. It is even considered that different coloured glass can be produced as desired in the different "cells" from the original colourless standard glass melted in the large furnace, by making the necessary additions in the separate fining chambers. A layout of this type would permit melting operation at extremely high rates with a minimum number of melting furnaces, but with a large number of refining tanks.

Auxiliary Electric Heating

As already mentioned, technical development is actively proceeding with the application of electric glass melting, in a number of different countries. An example of the application of electric auxiliary glass melting to the melting end of a Fourcault window-glass drawing furnace, is shown in Fig. 1. This installation, described by Litvakoski, is working in Russia.[3]

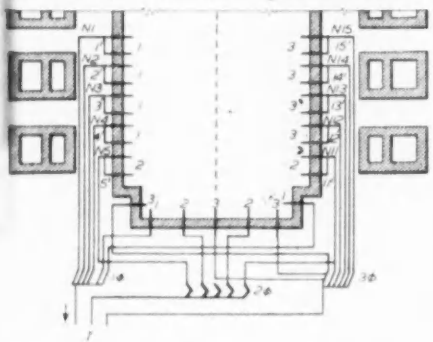


Fig. 1. Diagrammatic layout of the arrangement adopted for supplementary electric heating of the melting compartment of a Fourcault tank furnace. The electrodes are spaced apart by 0.75-1 metre distance

The author first describes the arrangements adopted at the beginning of 1949, at the "Staline" glassworks in Russia, with a view to obviating the inconveniences following the cooling of the vitreous glass mass, which occurred after the execution of hot repairs (without completely shutting the furnace down), to the melting furnace. Normally, a reheating of 3-4 days was necessary, and on the other hand, the quality of the glass manufactured was bad because of devitrification, produced particularly in the channel which ran from the refining compartment to the Fourcault drawing channel.

With a view to achieving a desirable rise in the temperature of these parts of the furnace, of an appreciable order, electrodes constituted by 76 mm diameter steel tubes, were introduced at a distance of 50 cm from the bottom of the channel and were immersed for a length of 150 mm in the glass (voltage: 120 V; current 115 amp; 3-ph arrangement with a neutral; 45 kW transformer). Thanks to this arrangement, in the period of 24 hours which followed the hot repairs, the production of the four Fourcault flat glass drawing machines had already attained 6,083 sq. metres.

Encouraged by the results obtained in this manner, the factory technicians then developed the electric heating of the melting compartment of the furnace. Actually, this improvement had been found to become necessary, following the replacement of the doghouse by a charging equipment, arranged to handle a damp sulphate batch and to charge in thin layers. The nitreous mass was too cold, and the batch formed heaped layers in the furnace and tended to create a blockage in the furnace, which arrested progression of the materials through the melting chamber.

The arrangement of electric melting adopted is shown in Fig. 1. Heavy iron electrodes, non-chilled and of circular cross-section, having dimensions of 1 metre in length and 55 mm in diameter, were introduced into the melting chamber through the side walls, the arrangement comprising two series of electrodes, stretching from the doghouse up to the second pair of burner ports; one series is arranged at a 500 mm immersion depth in the glass, and the other series at 650 mm depth. In the doghouse, there were placed in a similar manner electrodes immersed at a depth of 300 mm.

The total arrangement comprised 27 electrodes; the power required for operation amounted to 200 kWh. The source of the power feed was a triphase transformer of 400/80 V.

The adoption of this arrangement of point discharge heating, proved itself to be very effective in use and the functioning of the batch charging equipment was perfect; after the electric heating system had been adopted. The batch, that was charged into the furnace in regular thin layers of 6 to 7 cm thickness, spread over the entire surface of the molten glass. The glass melting was achieved, as is necessary for good operation, in the zone running up to half the interval separating the second and third pair of burner ports. The electrodes installed under the first and second burner ports ensured an intense fusion over the whole length of the furnace.

The quality of the glass as drawn, was found to be considerably improved likewise, and the melting capacity of the furnace was appreciably increased. Experience and development with the electric heating surface for this Fourcault furnace is still being continued.

Another arrangement of auxiliary electric heating applied to the refining chamber is shown in Fig. 2. This development by the St. Gobain Co., France[4], comprises the association of a source of heating situated above the glass level, from the gas flames issuing from the burner ports in the normal manner, with an electric heating current, introduced into the furnace by means of electrodes, which are arranged vertically across the furnace and some distance away from the side walls.

With this arrangement of vertical electrodes, there is produced in the refining zone, an ascending movement of the glass, starting from the bottom of the tank; the glass passing through this zone is thus forced to rise to the surface and, in addition, it is not in contact with the relatively cold side walls, at the moment when it is subjected to the highest temperatures. Thus discolouration of the glass is avoided, both by solution of the refractories and from that of the electrodes, which are located in a colder part of the glass and are constantly being washed by fresh cold glass, on account of the convection heating current set up in the glass mass.

The diagrammatic layout shows the glass tank provided at one end with the charging opening 2, through which the raw material is introduced into the furnace, and openings 3 at the other end of the furnace, from which the finished melted glass is withdrawn. The furnace comprises successively, the melting zone 4, the refining zone 5, and the cooling and working

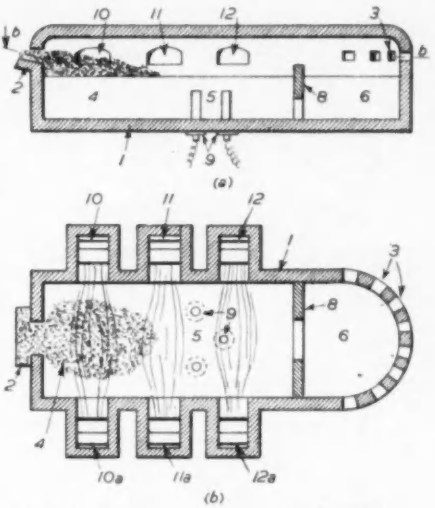


Fig. 2. Diagram of furnace with auxiliary electric heating in refinery end

zones 6. The refining zone follows immediately after the melting zone, without any separating wall between them, The refining zone communicates with the working zone 6, through the normal bridge wall arrangement, 8.

The electrodes 9 are placed in the refining zone, and are arranged vertically across the bottom of the tank. These electrodes are located at a certain distance from the sides of the furnace, as shown, and have a low height compared with the depth of the glass, in such a manner that their effect is exerted in the lower levels of the glass bath. At the source of heat issuing from these electrodes, there is associated a source of heat, exterior to the glass bath, consisting of side burners 10, 11 and 12, and 10_a, 11_a and 12_a, the flames from these burner ports passing into the furnace above the level of the glass.

All Electric Furnaces

Although, as already mentioned, at the moment, all-electric glass melting furnaces are confined to countries possessing abundant and cheap sources of electricity from hydro-electric power, nevertheless glass melting by electricity solely has great technical interest and possibilities. For example, within America, at the Boulder Dam and Mississippi and Tennessee Valley developments, as well as at Niagara, commercial localisation of all-electric glass melting factories becomes a distinct possibility, in the same way as the extensive electro-chemical-

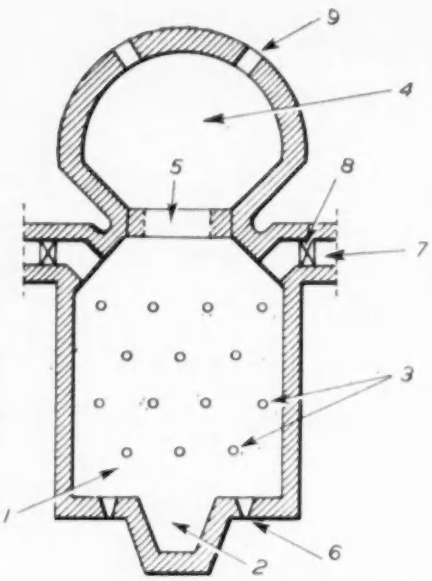


Fig. 3. Glass-melting furnace arranged for convection heat transfer from working to melting zone

producing industries have already become established at Niagara.

With a glass furnace melting solely by electric power, it will no doubt have been realised that the normal arrangement of gas and air ports, waste gas ports, flues and chimney disappears. The furnace becomes to all intents and purposes a refractory box, fitted with electrodes for the current discharge. This leads to a much greater thermal efficiency, as compared with the orthodox glass melting furnace, in which the heat is driven on to the surface of the molten glass, by radiation from the gas flames passing across the furnace and where the heat has to penetrate through the body of the glass to effect the melting. In the case of electric heating, the heat is actually generated within the body of the glass, where it is wanted and where it is most effective.

It is necessary even with this type of furnace to provide an arrangement of auxiliary melting burners, preferably oil fired. This is because some means of heating is required when the furnace is first being started up. The solid cold glass is not, of course, a conductor and it is necessary to melt the glass and get the furnace filled with molten glass before the electric melting can be started up. Once the furnace is started off in this way, of course, as the melting is continuous, the electric heating is then capable of keeping the unit in continuous operation. When the auxiliary burners are no longer required, the exit openings for the waste gases and the burner openings can be closed off.

However, there is another technical aspect, as regards the glass temperature, that needs to be considered with all electric glass melting. The temperature of the glass batch is lowest at the charging side and the highest in the neighbourhood of the gathering end of the furnace (working end). To operate a glass furnace in the correct manner, the temperature, which is for example, approximately 1,400° C, in the fusion zone, shall be slightly less, for example approximately 1,200° C, in the gathering section at the working end of the furnace. It is equally advantageous to counteract as much as possible the cooling resulting from the introduction of cold products into the charging zone.

To obtain such an effect during the melting process in an electric glass furnace it has been proposed to utilise convection circulation to provide the necessary heat transfer.[5] The arrangement adopted is shown diagrammatically in Fig. 3. The furnace comprises a melting tank 1, in which the fresh batch is introduced at ⁂, and a certain number of electrodes 3 are provided, connected to a suitable current source and immersed vertically in the glass. The molten glass passes into the gathering tank 4 for working, which is separated from the melting tank by the normal dividing bridge wall 5, with a duct beneath the glass level, through which the glass passes. Auxiliary fuel oil burners are placed in the openings 6, provided in the lateral wall of the furnace at the charging end. The products of combustion are removed by two flues 7, connected to a chimney.

After discontinuing the auxiliary heating, a gaseous current, preferably adjustable, is passed into the furnace and flows in a countercurrent, with respect to the displacement of the batch being treated. The gas is admitted in the neighbourhood of the discharge from the melting tank, and is discharged to the charging end of the melting tank in such a way as to decrease the calories at the discharge from the melting tank, where they are not wanted, in order to transfer them towards the entry of the furnace where they serve usefully to compensate for the cooling resulting from the introduction of a fresh batch.

In addition, this circulation presents not only the advantages of evacuating the gaseous products discharged by the batch (the accumulation of which in the furnace would be disadvantageous) but also enables establishment in the

furnace of a gaseous atmosphere of a special nature, which may in certain cases be preferable to an atmosphere of air, in the process of melting and refining the glass.

In the above arrangement this circulation is achieved in a very simple manner by connecting the openings 6 to a chimney, after extinguishing the burners, and by introducing air or a suitable gas by the conduits 7, which are disconnected from the chimney and may be connected to a source of air or gas, the section of the passage of the conduits 7 being capable of adjustment by registers or the like 8, in order to control the speed of the gaseous current in the furnace.

Similarly, air or gas may be admitted from the gathering tank, either by the existing openings or by openings such as 9, specially provided for this purpose and preferably made adjustable. This admission of gas may be employed either alone or in combination with that from the melting tank, for example, at 8.

Auxiliary Heating

An interesting example of auxiliary electric glass melting as applied to the reheating of glass for supplying automatic forming machines, is shown in Figs. 4 and 5. In Russian window

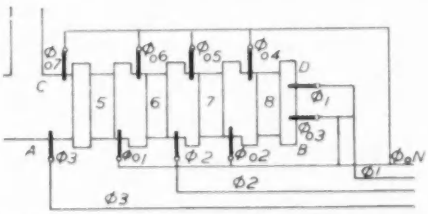


Fig. 4. Diagram of electrical layout for supplementary heating. The Fourcault drawing machines are located at 5, 6, 7, 8

glass factories, the Fourcault drawing machines are arranged in series one after the other, on the glass drawing channel. This arrangement presents certain technical disadvantages, manifesting itself in faults in the drawn flat glass. These faults are principally of two kinds:

On the one hand, a wave formation has been observed, which appears to be due notably to a lack of thermal homogeniety of the vitreous mass. On the other hand, zones of devitrification have been observed, apparently caused by the temperatures which are too low at the bottom of the drawing chambers.

Accordingly, to overcome and remove these faults, it is necessary to have in the Fourcault drawing channel, glass temperatures which are

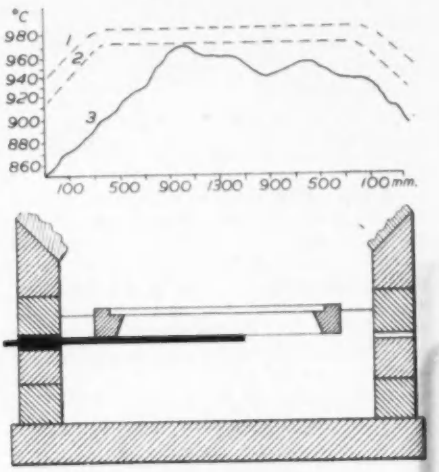


Fig. 5. Temperature distribution of the glass under the debiteuse of the Fourcault machine No. 8.

Curve 1: With electrodes immersed at a depth of 35 cm.
Curve 2: With electrodes immersed at a depth of 50 cm.
Curve 3: Without supplementary electric heating

as uniform as possible and which should be sufficienctly high; Byachkinasi and co-worker[6] indicate the means they have adopted to achieve this, in the Russian Staline Fourcault glassworks, after numerous preliminary test arrangements.

The initial situation was as follows (see Fig. 4). The temperature of the glass against the wall AB (front) was 30° C lower than that of the glass along the wall CD. The differences in temperature of the glass under the drawing debiteuse, reached 45° C. The temperature of the mass of glass at a depth of 55 cm was 990° C, or in other words, the glass mass was at the temperature devitrification limit. The No. 8 drawing machine was practically not able to function at all.

In Fig. 4 is shown in a diagrammatic manner the schematic layout finally adopted (comprised by an addition of supplementary electric heating of the glass). The electrodes were constituted by steel tubes which were 75 mm in diameter and 1.1 m in length, to which were welded pieces of the same diameter, 35 cm in length, of ST3 steel. The electrodes were introduced by openings made in the walls of the channel, to a depth of 30 to 50 cm below the surface of the glass and the extremity pieces were immersed in the glass mass, for a length of 30 cm. It should be noticed that the electrodes were placed in the reheating chamber and not directly in the drawing machine pit.

The diagrammatic view (Fig. 4) shows the electric layout arrangement adopted. The current feed was covered by a 45 kW transformer whose low tension side (between phase and neutral) could be varied from 40 to 140 V by tappings of 10 V.

The technical results obtained with this supplementary electric heating were as follows (see Fig. 5).

After the installation of the electric heating, the temperature of the glass under the debiteuse was uniform over the whole length of the melt; the temperature in any horizontal section of the reheating chamber for the No. 8 drawing machine had become uniform; the temperature was 1,030° C at a depth of 55 cm, and rose regularly to 1,140° C, at the surface; all risk of devitrification had accordingly been removed; initially, the lowering of the temperature from the surface downwards was 150° C.

The temperature of the glass, at the right of the slot of the debiteuse, of this machine, had been increased by 30° C, and reached 980° C; this is an excellent technical temperature, for the working of the drawing machine and the formation of the glass sheet.

For the same given production, the immersion of the electrodes in the glass at a depth of 35 cm, gives an economy in power consumption of 15 to 18 per cent, by comparison with an immersion depth of 50 cm. In addition, this immersion depth of 35 cm would appear of being capable of being reduced still further to 20 cm.

The optimum electrical conditions during operation were as follows: Voltage at the electrodes 40-60 volts; current density in the phase collectors: 140-170 amps. Power consumption per drawing machine: 6 kW.

The sum of the current densities in the electrodes arranged along the front wall, should be 34% greater than that comprised in the electrodes serving the rear wall.

For a channel designed to feed 8 to 10 Fourcault drawing machines, it would be sufficient to instal a triphase transformer of 75-100 kW capacity.

Regarding the quality of the drawn glass obtained, the results could be summarised as follows suppression of the opaque zones; considerable reduction in the wave formations; an increase, amounting from 15 to 20% in the quantity of glass of first and second grade manufactured, melting with a mixture of sulphate and carbonate of soda; an increase of 20% in the production of sheet glass, per hour, per machine.

Melting Colourless Glass

In spite of the progress that has been achieved in the electric melting of glass, the technical problem has still remained of being able to produce a really colourless glass in a furnace run with electric melting. J. Finger[7] has described an installation in Spain, in which it is claimed, this problem has been overcome.

If steel or iron electrodes are used, difficulty may be found on account of the small amount of iron introduced into the glass, which although for window glass for example, would not matter, would introduce an undesirable colour when a really colourless glass was desired to be made for table ware, for example. The condition of oxidation of the iron is of importance to the degree of colour imparted to the glass by a given amount of iron oxide, and as regards the condition of oxidation of the iron, this is always rather unfavourable in the electric furnace, as compared with a fuel fired furnace. This is because of the fact that the electric furnace has always a tendency to introduce reducing elements in the glass.

Thus there are certain technical difficulties in the way of obtaining a completely colourless glass in the electric furnace. In the furnace constructions in Spain and Portugal that have been developed for the melting of colourless glass, the designers have been guided in the, first place by the exercise of caution as regards the heat distribution in the furnace, and the temperature necessary for a normal refining, is not exceeded.

For this reason, three-phase melting furnaces are avoided, which in the most logical form of a star, offers the risk of an increase in intensity and temperature in the internal corners. Likewise, carbon instead of iron electrodes are used and an endeavour was made particularly to avoid an overheating of the glass around the electrodes. With these measures, it was actually possible, during the course of melting campaigns, carried out with an electric furnace and a fuel-oil fired furnace, to obtain a more colourless glass with the electric furnace. These results were obtained with the use of relatively high voltages, since in this manner, upon reducing the intensity of the current, it was then possible to reduce the cross-sectional area of the electrodes used and so lessen the electrode solution factor.

Three-phase alternating current is generally supplied in Europe for power supplies and in view of the large power capacity of electric glass melting furnaces, the electricity supply

authorities, do not, as a rule, permit the installation of single-phase furnaces.

For this reason, and in order to avoid the difficulties experienced in the immediate application of three-phase current, for the melting of colourless glass, acceptable solutions have been sought, such as the use of several single phase furnaces, arranged in such a manner, that a balance is obtained in the tri-phasic network, as for example, by means of the separation of the three phases in the following manner:

Two phases disposed for one furnace and the other single phase for another furnace. When the layout concerns three equal furnaces, this may be done with greater facility, using one phase for each furnace. Two equal furnaces may be balanced in the tri-phasic supply, using transformers in Scott connection.

When it is desired to connect only one furnace, connections are also available, which are more or less satisfactory, using for example, the two phases combined for the melting, by means of a single phase tank, and the third phase for heating the working chamber, whereby, and especially in such small units, a fairly perfect balance is obtained.

Where electric power networks of large capacity are available, it would not be necessary to resort to this arrangement above, as then relatively large, single phase furnaces, directly connected in the manner deemed more suitable, would be permitted. It is considered that it is advantageous to use a high voltage when melting for a colourless glass with electric heating, and as mentioned above, the direct use of three-phase current should be avoided. Either a single phase melting furnace should be used, or else if a three-phase electric supply is the only one available, then the three phases should be used in the manner suggested above.

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6. Byachkinasi, Joukowski, and Stepanenko: *Steklo i Keramika*, vol. 6, No. 3, pp. 3-9.

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Works Standardisation

Achievements of the Brush Electrical Engineering Co.

MOST manufacturing concerns adopt a certain amount of internal standardisation, but few go so far as to have a permanent Standardisation Committee. Among these is the Brush Electrical Engineering Co., which held a four-day exhibition at Loughborough this week, to focus the interest of its workpeople upon the importance of further standardisation in all departments of its extensive works.

Awards were offered for the best suggestions for reducing in variety the manufactured products, raw material, or parts.

The history of standardisation within the organisation goes back to the system, initiated in Yeovil as far back as 1918 by Petters, Ltd., now part of the Brush concern. Ten years ago the Brush Standardisation Committee was formed, and it has functioned without interruption ever since. Today it is composed of the Technical Director, the Chairman, the Secretary and representative executive members of the technical and production staff.

The main Committee sits at regular intervals and matters of standardisation as they affect the largest and smallest activity are discussed and settled. Sub-committees deal with the preparation of the resultant standards.

Primarily, the duty of the main committee is to reduce the variety of articles and materials in common use by the Company to an absolute minimum so as to simplify storekeeping and also maintain capital investment in stock at the lowest level compatible with efficient production.

To the question as to why British Standard Specifications are not used as standard documents, the Company replies that B.S. Specifications are as a rule in pamphlet form containing much more information than is generally required. The Brush Specifications on the other hand, are in sheet form and contain what is only considered to be essential information.

Among achievements of the Standards Committee are the reduction in variety of twist drills taper shank sizes ($\frac{1}{32}$ in. to 3 in.) from 155 to 68; reduction in number of solid-drawn steel tubes ($\frac{1}{16}$ in. to 7 in.) from 73 to 33; reduction in number of copper tubes from 17 to 2; hard copper strip from 32 to 15, and soft copper strip from 22 to 3. On the tool side a notable move is the elimination of single-headed and the introduction of double-headed spanners throughout.

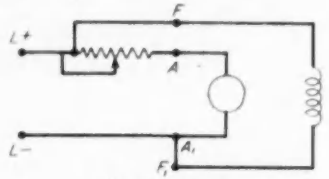
Problems and Practice

IN ENGINEERING

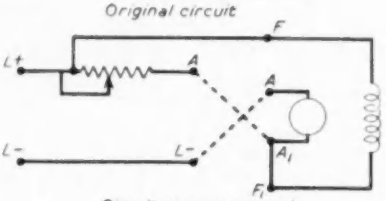
Cross Connection Causes Trouble

RECENTLY, owing to mechanical trouble, a 35 h.p. d.c. motor was disconnected and removed from its position driving a fan.

On reconnecting, it was found that the starting resistance could only be brought about half way over when the fuses would melt.



Original circuit



Circuit as reconnected

Incorrect connection that caused fuse blowing

Investigation revealed that the motor connections A and L–, which were self-coloured, were crossed. This meant the field voltage was now the volts drop across the starting resistance and as the resistance was cut out, obviously the field became weaker, thus with reduced back e.m.f., the armature current rose to a value sufficient to blow the fuses.

Had this motor been connected other than direct to a large fan, the speed would have been noticeably much higher.—*J. W.*

Theatre Lighting

IN the modern commercial multi-purpose theatre anything which can reduce the time spent on electrical "fit-ups" of productions is invaluable. The following is an example of a modification to our standard stage lighting equipment which in truth involved no technical knowledge, but nevertheless saved hours of "fit-up" time and also solved a problem for the switchboard operator during the actual show.

In most productions, musical comedies, plays, etc., many practical electrical fittings are utilised in their settings. In practice, overhead batten spotlights are also used in conjunction with these fittings to provide a higher standard of illumination, create highlights and shadows to the stage picture, and to emphasise selected focal points giving dramatic value and significance. When an actor seemingly switches on a fitting (effected in actual fact by the switchboard operator) not only the lamp in question is "snapped in" but several overhead batten spotlights covering the same area. The important point here is that both sources of light should synchronise on being switched on. Depending on the type of switchboard, this operation is difficult to accomplish, because each individual controlling switch is invariably mounted far apart from another. A split second in delaying any one switch and the result is that the actor is left fumbling with fittings, or dummy scenery switches, whilst spotlights "snap" in from all directions. Failing that the fitting is "snapped in" first and the spotlights follow. In either case the effect is spoilt, and the audience is aware of the deception. It should be pointed out here, in order to clarify the electrical arrangements on the stage, that all fittings are "fed" from outlets in the stage floor. During the "fit-up" a great deal of time is spent in "wiring every fitting up" independently from one another, which is essential, for lighting plots vary considerably, even in plays.

The modification devised consisted of attaching to each spotlight on the overhead bar (12 spotlights in all) a t.r. flexible, making a permanent installation of these by running them permanently along the bar, and down to the stage floor via the back of the false proscenium. A 5 A domino plug was attached to each cable, and a 6-way 5 A socket box was provided both on the "P" and "O.P." sides of the stage.

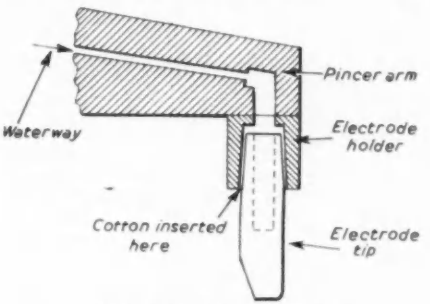
All that is necessary now during a "fit-up" is to attach the desired spotlight cables to the socket box along with the fittings cable on the side on which they are required. Precious time is saved by this method, and during the running of the show the switchboard operator has simply to operate the appropriate spotlight switches, and both fitting and spotlights synchronise perfectly.—*C. L. R.*

Is Enough Attention Paid to Earthing?

I THINK this an example to show there is not. A Health Dept. man was "doing his rounds" of the gulleys and when he went to lift one he got rather a nasty shock. He reported this and the Mains Dept. got out the "fault kit," but found the gulley grid quite dead. Then a shovel blade conveniently got across from the grid to the down spout of a building and there was quite a "splash". The main fuses were drawn in the building and the leak had gone. The installation was tested and found to be down to earth. It was also found that the installation had been earthed to the central heating system, whose exhaust extended to the guttering at the ridge, thereby making the down spout alive. The Health Dept. man said he had hold of the down spout when he put his lifting irons into the grid. A case of this kind could easily have had serious consequences to a child playing around the grid.—*P. E. G.*

Welding Machine Fault

ON checking up a spot-welding machine that wouldn't spot, a voltage test recorded full mains voltage at main switch. The inspection door of the transformer unit was opened, the main switch closed, and operator told to press his push-button switch on the welding pincers. The main contactor operated, thus ensuring



Cross section through welder

supply to transformer and leaving only the secondary circuit to test. An inspection of both heavy-current flexes to welding pincers proved that they were satisfactory. On extracting one of the electrode tips from its holder, it was found that a couple of turns of cotton had been wrapped round the tip thus causing an increase in resistance against the low secondary voltage and, therefore, no spotting current. I questioned the operator about the cotton and his reply was he had put it round the tip to stop a slight water leak from the holder which needed renewing. A new holder was fitted and the cotton removed, the machine worked normally.—*W. Adam.*

An Armature Breakdown

ON several occasions over a period of years we had received the same motor armature for repair and it was observed that the breakdown was always of the same kind—a failure of insulation at one point as though an excessive voltage had been applied. It was suggested to the customer that it might be worth while looking into the operation of the motor to see if in fact a high voltage was being developed, as might happen due to breaking an inductive circuit.

The control arrangement proved to be an interesting one. The motor was driving a large lathe used for turning very long shafts and there were three push-button stations each with four pushes marked "Start," "Stop," "Raise Speed" and "Lower Speed." The shunt field regulator was moved by a motor controlled by the last two buttons. Fortunately a diagram of connections was available and it was soon checked that there was no highly inductive circuit other than the main shunt field which always had the armature circuit across it without interruption.

The control system was operated several times and its action studied with the help of the diagram. It is usual in such automatic systems to have a contactor which short-circuits the shunt field regulator until starting is completed so that the motor starts under full field. In this case, however, the arrangement was that immediately the stop-button was pressed the main contactors opened and the regulator motor quickly returned the regulator to the full field position ready for the next start. Thus, during the slowing down period the motor was acting as a generator on full field and on open circuit.

The speed range was three to one, and it was estimated that if the stop button were pressed when the motor was running at top speed nearly 1,000 V would be generated. It was not thought wise to test just how high the voltage would be in case another breakdown was caused, but instructions were given to decelerate each time before operating the stop push. So far as is known no further breakdown has occurred.—*M. C.*

Contributions to this page dealing with specific items o interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

MECHANICAL HANDLING EXHIBITION

Ransomes Forklift "20"

Speed Goods the Electrical Way! —and reduce costs

THE second Mechanical Handling exhibition which opened at Olympia on Tuesday is timely. It is being held within a few weeks of the publication of the productivity team's report on *Materials Handling in Industry*. It is also being held at a time when industrialists everywhere are striving to increase production —in fact at no time have British manufacturers been more conscious of mechanical handling. The industry is also hoping to sell to visitors from some 28 foreign countries.

Simultaneously with the exhibition a convention is discussing the recommendations of the productivity team, the newly published report of the Working Party on Increased Mechanisation in British ports, and papers contributed by mechanical handling specialists.

A large proportion of the exhibition, which remains open until June 17, is concerned with electrical equipment. Electric trucks, batteries, motors, conveyors and cranes all play their part in speeding the handling of goods. Many electrical manufacturers have taken the opportunity to introduce new or improved aids, and exhibits with an electrica linterest are reviewed in this and the following pages.

Electric Trucks

Exhibited for the first time by TOMLINSON (ELECTRIC VEHICLES) LTD. is the "Stillager," a new pedestrian-controlled battery-operated truck for use with normal type stillages. With the exception of the elevating platform, operated by an hydraulic pump and rams, all controls (steering, braking and speed) are contained in the "Tiller" steering arm. By depressing the arm a 3-unit switch-controller is brought into operation stage by stage, ensuring smooth starting under varying loads. On return, under its own tension, the arm automatically operates the braking mechanism. Tomlinson are also exhibiting their "Industrial Roadster" and "Universal Works Truck."

Another new truck is being shown by CLECO ELECTRIC INDUSTRIES, LTD., who have just commenced production of a 2,000 lb. electric straddle fork lift truck. A development from the firm's straddle fork truck, this vehicle has an electro-hydraulically operated 8 ft. lift. The gallows are telescopic, and one lever controls lowering, raising and stopping motions, and a double-handed horizontal tiller controls all driving operations. When the load reaches an elevation of 4 ft. 6 in. while the truck is moving, the speed automatically drops to a crawl.

I.T.D. LTD.—recently acquired by the Austin Motor Co. and Crompton Parkinson, Ltd.—are exhibiting a range of electric trucks. After twelve months of exhaustive tests the new "Stacatruc" Model 20 EH/9 is on show. With a capacity of one ton, at 24 in. load centres, the truck has a lift of 9 ft. Battery power is sufficient to last a ten-hour day. Another result of the acquisition is the marketing by I.T.D. of Crompton Parkinson's "Electricars." Models T.U.20, one ton capacity fixed platform, and T.L.R.6, with an elevating platform, are on show.

Of six "Conveyancer" trucks being shown by ELECTRO-HYDRAULICS, LTD., three are battery electrics. A Mark VI, 4,000 lb. lift capacity, is fitted with an hydraulic squeeze clamp for handling bales and crates without the use of pallets or stillages. A similar model is equipped with a completely rotating head and forks. The other electric truck, also of 4,000 lb. capacity, has a "free-lift" stacking unit giving 64 in. of free lift, enabling the truck to be used under low ceilings.

Pioneers in the production of electric trucks, RANSOMES, SIMS AND JEFFERIES, LTD., have six different types of battery electrics on view. Besides a "Forklift 40" capacity 2 tons, 10 ft. lift (also available with 8, 12, or 14 ft. lifts), a "Forklift 20" is shown, with similar loading dimensions

but with a one-ton capacity only. For heavier industrial purposes there is the E.N.U.8 of 2-ton capacity with an elevating platform and the N.U. crane truck, a 30 cwt capacity platform with a jib capable of lifting half a ton on a 5 ft radius. A T.E. tractor capable of hauling loads up to 30 cwt is also on show.

A complete series of "Electric Eel" trucks are being shown by STEELS ENGINEERING PRODUCTS, LTD., including 20 cwt and 30 cwt load-carriers, and a 50 cwt low lift truck for stillage work. The latest "Electric Eel" tractor has a drawbar pull of 450 lb and is capable of pulling a series of trolleys loaded up to 10 tons. Except for this tractor, all models are fitted with the Coles patented "instinctive" system of steering.

A representative selection of their tubular steel stillages developed for British Railways and other industries is exhibited by TUBEWRIGHTS LTD., a subsidiary of Stewarts and Lloyds Ltd.

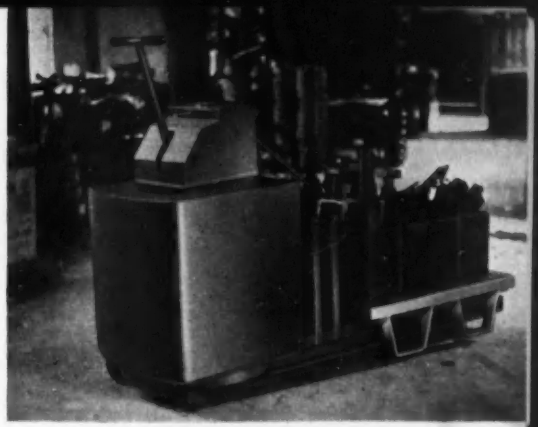
Electric trucks are also being exhibited by LANSING BAGNALL, LTD.; ANGEL TRUCK CO., LTD.; WINGROVE AND RODGERS, LTD.; LEVERSTART, LTD., and GREENWOOD AND BATLEY.

Batteries and Rectifiers

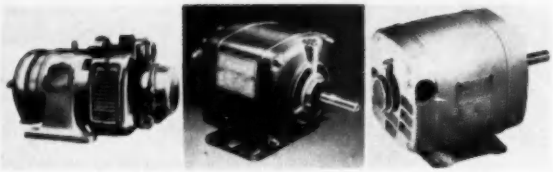
Typical "Kathanode" accumulators for battery-powered cranes and locomotives and a representative range of batteries for heavy and light duties are being shown by the D.P. BATTERY CO., LTD.

On their stand, BRITANNIA BATTERIES, LTD. feature a nickel-iron alkaline traction battery for heavy work, and two of the Alklum nickel cadmium steel alkaline batteries for starting and lighting on all types of commercial vehicles. For industries where goods are loaded at night, the battery-operated floodlighting set provides the answer.

TUDOR ACCUMULATOR CO., LTD., are displaying three crates of cells of the type used extensively for industrial electric trucks, locomotives and road vehicles. Specially designed to withstand



Electric trucks for all purposes. From top to bottom: Tomlinson's new "Stillager"; left: Electro-Hydraulic's battery-electric "Conveyancer"; right: the Leverstart one-ton stacker; latest "Electric Eel" tractor by Steels Engineering Products Ltd.; right, the new "Stacatruc" model 20 EH/9 fitted with B.T.H. motor, left the new Cleco straddle truck.



Motors, l. to r., Asea commutator, Newman "Elf" fractional h.p., Hoover ¼ h.p. split phase, drip-proof

stresses and strains, the batteries incorporate a shockproof triple separation of the positive and negative plates with felted glass wool, perforated ebonite sheet, and specially treated ribbed wood. Also shown is the "Safetylyte" emergency lighting plant, type A1, which, with 14 cells of 30 a.h. capacity, supplies a 25 V circuit.

Some of the uses of metal rectifiers are being demonstrated by WESTINGHOUSE BRAKE AND SIGNAL CO., LTD., who are also showing phase converters and air control apparatus. Working rectifiers operate lifting magnets and magnetic chucks, chargers for electric trucks, and other mechanical handling applications.

PARTRIDGE, WILSON AND CO., LTD., are featuring models from the Davenset range of rectifiers specially designed for the automatic charging of electric vehicle and truck batteries. Rectifying equipment for use as d.c. injectors in connection with vibrating screens and handling devices, the high discharge pistol grip battery tester, a hand inspection lamp and l.v. transformer are on view.

Electric Motors and Control Gear

Three N.S. variable speed a.c. motors are in operation on the stand of LAURENCE, SCOTT AND ELECTROMOTORS, LTD. Besides a small motor with hand-operated speed control from the standardised range there is a motor with special type reversing and speed control lever as applied to hoist drives. The third motor has electronic control for very precise speed regulation. A "Speedmaster" is shown controlling the speed of a number of standard squirrel cage motors and the Trislot high torque (described in our issue last week) is also being demonstrated.

New HOOVER fractional h.p. motors of the latest design, ranging from $\frac{1}{8}$ to $\frac{3}{4}$ h.p. drip-proof frame and $\frac{1}{6}$ to $\frac{1}{2}$ h.p. totally enclosed frame are displayed. Capable of almost unlimited adaptation to modern industrial needs, they will interest in particular all those requiring unit drives of high dependability and efficiency for flexible conveyors and many types of belt conveyors.

Both motors and control gear are being exhibited by METROVICK. Working demonstrations include the operation of a ½-ton Wharton crane pulley block fitted with an a.c. motor, a.c. Perigrip brake, and type DOC starter, and a Vaughan crane centre gearbox for long travel motion powered by an electric motor, control gear and electro-hydraulically operated Perigrip brake. Motors on view are a typical heavy-duty d.c. type AMX motor; a special line of crane motors, type DK; type KZ squirrel cage and type MZ slip-ring induction motors. Several types of automatic and semi-automatic control gear are demonstrated.

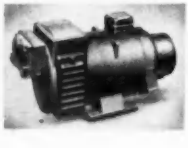
Their latest motor, the "Elf" fractional, is a strong point of the display by NEWMAN INDUSTRIES, LTD., Incorporating three important advances in design, the motor has reduced overall dimensions, extreme quietness of running throughout the life of the motor; and a silent reliable centrifugal switch. Apart from motors from the standard range, barrel-type flameproof 25 h.p. and 40 h.p. motors designed for mining operations and seven loom motors are displayed together with direct-on-line, reversing, star delta and sectioned starters.

On the stand of ELECTROPOWER GEARS, LTD., spur wheel type geared motors from $\frac{1}{20}$ h.p. to approximately 25 h.p. are exhibited. The range includes horizontal and vertical flange mounting types and a small set of fractional single worm-geared motors. Special flange-mounting motors, suitable for fitting to a firm's own gearboxes, are also shown.

Closely allied to motors are gear units, and DAVID BROWN AND SONS (HUDDERSFIELD) LTD., are showing a selection from their range of Radicons. Also exhibited is the "Coventry" geared motor made by the Coventry Gear Co., and available as either a double or triple reduction unit. With a motor speed of 1,425 r.p.m. no fewer than 17 output speeds are provided.

A large range of electrical equipment for application to all forms of mechanical handling can be found on the exhibit of B.T.H. Most imposing is the demonstration of a hoist incorporating "Stacreep" control developed by B.T.H. to obtain stable creeping speeds with a.c. motor drives. Other exhibits are an excavator control console for a walking dragline, electric drives of varying applications, fractional h.p. motors, geared motor units, fractional h.p. geared units, motor control equipment, unbreakable resistances, and electronic control equipment. An interesting working exhibit is the electro-magnetic can-conveyor built for Tate and Lyle, Ltd.

Left: "Speedmaster" variable frequency converter; right: Coventry geared motors



Conveyors

Full-scale working equipment and an operating model complete in all details make for a clear understanding of handling systems built by FRASER AND CHALMERS ENGINEERING WORKS. Featured are a model of a Marshall wagon tippler for a 10-ton wagon, Sherwen electro-magnetically operated vibrating equipment, an electric screen, a vibrating table, and foundry shakeout.

Main exhibit of INTERNATIONAL COMBUSTION LTD. is a full-scale working section of a heavy duty gravity bucket conveyor similar to many being installed for coal handling at some of B.E.A.'s new generating stations. Nominal capacity of this type of conveyor is 125 tons of coal per hour. Other exhibits include a model of a typical Beaumont drag scraper plant; a short section of conveyor with examples of oil-filled and ball-bearing idlers; Syntron feeders, vibrators, and a Ty-Rock full floating screen.

Abbreviated to suit the limits of the stand, a 36 in. wide submerged belt ash conveyor is being shown by JOHN THOMPSON LTD. This type of conveyor is used for quenching and transporting ash and clinker from water tube, economic or Lancashire boilers. Second exhibit is a standard portable belt conveyor with 30 ft. pulley centres, in this case used in conjunction with a "Triumph" elevator, both driven by totally enclosed motors.

MITCHELL ENGINEERING LTD. show three models of their plant. A transporter for coal storing, reclaiming, and loading vessels; a coal preparation plant capable of handling 800 tons of coal per hour now being built for the N.C.B., and a working model of an air extraction ball tube mill.

Working models of coal and ash handling plant are also featured by BABCOCK AND WILCOX, LTD. An ash disposal plant illustrates pumping to "fill" or alternatively to ash bunkers and also hydro-vac dust disposal to atmospheric bunkers. Another model shows coal, ash and dust plant operating in conjunction with a power station containing 300,000 lb./hr. B. and W. pulverised fuel fired high head boilers.

Exhibitors of electrical equipment under this title also include LOCKERS (ENGINEERS), LTD., vibrating feeders; FOURWAYS (ENGINEERS), LTD., conveyors; J. COLLIS AND SONS, conveyors and stackers.

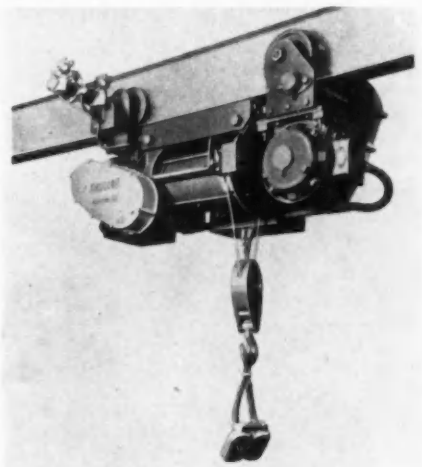
Lifting Tackle

Combined stand of ASEA ELECTRIC LTD. and FULLER ELECTRICAL AND MANUFACTURING CO., LTD., features various models of the Asea pulley blocks. All machines are powered and visitors can operate the inching or creeping speed attachment. The Fuller Co. show a number of variable speed a.c. commutator motors, which by their inherent shunt characteristics and because they can be regulated to the exact speed required for various loading conditions, are ideally suited for driving various types of conveyors.

Members of the "600" group of companies are also exhibiting lifting gear jointly. Besides the Jones KL 15 mobile crane with a lifting capacity of 15 cwt., GEORGE COHEN SONS AND CO. feature the G.E.C. 2½ cwt. double-rope electric hoist and a range of "Hoistmaster" electric hoists from 5 cwt. to 5 ton capacity.

Their new 20 ton mobile crane dominates the stand of STEELS ENGINEERING PRODUCTS LTD. Self-propelled, and mounted on pneumatic tyres, power is obtained from a variable voltage petrol/diesel generator. Also shown are sectional jibs, several smaller types of cranes, and Coles electric hoists fitted with the new patented creeping speed, allowing for a 10 to 1 reduction.

Other exhibitors of electrical lifting gear include: ROWNSON, DREW AND CLYDESDALE, LTD., sack hoist and platform hoist; GEO. W. KING, LTD., 'Mytemin and Marvex' chain pulley blocks; AABACAS ENGINEERING CO., LTD., hoist blocks, o.h travelling cranes; WHARTON CRANE AND HOIST CO., LTD., o.h. cranes, hoists, blocks; CLAYTON CRANE AND HOIST CO., LTD., o.h. cranes, hoists, blocks; VAUGHAN CRANE CO., LTD., o.h. cranes, blocks and trolleys; BUTTERS BROS., two-motor derrick crane; A. C. E. MACHINERY, LTD., winches; IRVING ENGINEERING CO., LTD., o.h. cranes; CHARLES WILLETTS (JN.); LTD., pulley blocks, sack hoist and winches, J. W. FLOWES AND CO. (ENGINEERS), LTD., stacking crane; PATTERSON HUGHES ENGINEERING CO., LTD., o.h. travelling cranes, hoist blocks; JOHN BARNSLEY AND SONS, LTD., o.h. travelling cranes and hoists; FARLEIGH HOISTS AND VAUGHAN LIFT ENGINEERING, LTD., pulley blocks, cranes and lifts; W. AND E. MOORE, LTD., hoists; STRINGER AND SON (CRADLEY HEATH), LTD., blocks; TIMSON BROS. (ENGLAND) LTD., hoists.



The "Hoistmaster" electric hoist

Meter Production

New Scottish Factory Opened

LAST week we were privileged to be present at the opening of the new Scottish factory established by Sangamo Weston for the production of meters and instruments. The factory itself is situated on the Port Glasgow Estate of Scottish Industrial Estates, Ltd. This estate is some twenty miles from Glasgow and is located on the south bank of the Clyde, 430 ft. above sea level.

Floor space to the extent of 22,000 square feet is available, and since the completion of the building in April, 1949, a production line for Sangamo HMT watt-hour meters has been established, staffed by local people with a nucleus of management from the Enfield factory. The employees so far engaged have proved themselves to be extremely adaptable to the class of work involved, and the quality of workmanship is particularly high.

Although at present the work is confined to the production of the HMT meter only, ample space is available to allow for the establishment of other lines and for the introduction as necessary of further plant and equipment. Much of the basic material is at present being made at the parent factory at Enfield, and is shipped to Port Glasgow for incorporation in the meters, but it is expected that ultimately the full production will be carried out.

Striking features of the factory are its spaciousness and cleanliness, the latter being enhanced by the elevation of the site and the absence of local atmospheric pollution. For meter assembly work these conditions are ideal. Other points striking the observer are the comprehensive testing and checking arrangements including special light load arrangements to cope with the requirements of the local Electricity Board.

Prior to the formal opening of the factory, a luncheon was provided at which Mr. S. B. Rogers, Chairman and Managing Director, proposed the toast of the "Guests," and the Rt. Hon. The Lord Bilsland, who is Chairman of Scottish Industrial Estates, Ltd., replied. He welcomed the Company to Scotland, and pointed out the importance of its products in all spheres of modern industry. In this area particularly a new industry of this type was invaluable. He assured the company of full co-operation in their development and promised further expansion of light engineering industry.

Three of the Manufacturing Processes

Top right: Multiple meter testing.

Centre: Mounting ring to base.

Below: Base assembly.

Fearsome Faults

Strange Stories of a Maintenance Man

THE word "Why?" looms large in the life of a maintenance electrician. There was, for instance, the case of the ultra-rapid kettle which sounded good, but as our prestige is not built on false premises, an investigation was made. The kettle had an immersion element which was found to have an earth fault. There was no earth conductor, the element was effectively insulated from the body by rubber washers inside and out, and the kettle, a flat-bottomed type without feet, habitually stood on the top of the grill-boiler. The sum total of all this—the kettle was working as an electrode boiler. Why hadn't somebody had a shock?

On another occasion a consumer, whose house I was working in, made a casual reference to the very bad interference on the radio. Investigation traced the trouble to a main cut-out. The service main to these houses terminated in a passage in a four-way splitter, thus feeding four houses. The faulty cut-out, which did not control the supply to the house I was concerned with, was in exceptionally bad condition due to arcing, yet no complaint had been received from the people concerned.

A third complaint on these lines concerned a radiator which was not giving sufficient heat. The situation was a medium-sized rambling factory and the complaint had emanated from one of the offices. Being a specific complaint concerning one radiator, I went direct to the office concerned. Radiator, socket, and local fuse were all in good condition, but there was obviously reduced voltage. I wended my way to the service intending to make a voltage test there, and I found this: The supply was overhead 3-phase 4-wire from an outbuilding and terminated in four fuses. Just to make certain that something would go wrong, the four fuses were identical. They had been wired with various gauged wire with a strong one in the neutral. It only remained for one or two lights to cease functioning and for the office amateur to look for the fault in the main cut-outs, after which the neutral was left with a strand of 26's in circuit. Needless to say, this did not last long.

It was, I suppose, too much to expect anyone to complain that their lights were too bright!

Earth Returns

Installations working earth return are frequently discovered through a complaint of flickering lights, due to the earth connection being loose. One earth return circuit, however was discovered by the unfortunate plumber who went to repair a leaking water main in the front garden. Unfortunate in that he received a nasty shock when he broke the pipe, but he was fortunate not to be electrocuted. The tenant had fitted a 3-pin plug to a new radiator successfully getting his connections crossed, and the fire was in use when the poor plumber arrived.

On the question of amateurs, I went to another job where the complaint referred to a fuse which would persist in heating up. I made a routine inspection of the fuse, finding the contacts in good condition, connections tight, and the wire apparently of ample gauge. An inspection of the installation failed to reveal any overload or leakage current. I next withdrew the fuse from its carrier and examined it more thoroughly. It was discoloured, of course, but I had my suspicions, and asked the consumer for a sample of the fuse wire he had used. It was nickel-chrome resistance wire.

Consumer Foibles

On many of my calls, whilst the electrical problem was slight or non-existent, a bigger problem was to convince the consumer of the facts. At one "no light" call, for instance, I noted immediately that the slot meter registered zero coin credit. I told the consumer, an elderly lady, that the meter required a shilling, only to receive the answer: "We haven't a slot meter." This so staggered me that I actually returned to the service to have another look at the meter. It transpired that the consumer had only been in occupation three or four days and the slot meter had been left there from the previous tenant. The good lady had signed for a quarterly meter, and a quarterly it must be!

Again, a very perturbed consumer rang up one evening to say that since we had fitted the immersion heater that morning, the water would not stop boiling. I arrived at about 10 p.m. to find the situation thus: The house was large and used as a charitable hostel. The cylinder, heated by a solid fuel boiler in the cellar, was about 50-gallon capacity and had certainly been lagged and the heater fitted, *but it had not been wired.* Well, this took some

explaining, as the boiler had been allowed to go out after the lagging had been fitted that morning, the heaters having been fitted the previous day. Presumably little hot water had been used during the day and then, when the proprietress discovered there was still hot water after a couple of residents had bathed, she became very concerned. This, by the way, demonstrates the value of lagging the cylinder where possible. It also reminds me of the gentleman who claimed, after his immersion heater had been fitted, that water boiled by electricity was hotter than when boiled by any other means.

HOUSE OF COMMONS FITTINGS

Making the Standard Fittings at the G.E.C. Works, Birmingham

Above is a view of the finished ceiling fitting being used for general illumination in the new House of Commons. The contract for the entire work was secured by G.E.C. and some of the processes involved are shown below

Above is molten bronze being poured into a mould to produce the ornamental framework

An electrician is seen above fitting the G.E.C. instantaneous start control gear. Accommodation is provided in these fittings for one, two or three lamps as desired and the neccessary control gear. The centre photograph shows a number of fittings being assembled. The workman shown in the bottom right picture is carrying out final finishing on the bronze framework

overseas news

Rehabilitation in Borneo

After three years of rehabilitation and reconstruction, the plant of the Sandakan Light and Power Co. (1922) Ltd., Borneo, was now operating successfully, the chairman reported at the annual meeting recently. In 1945 all that was left of the company's fixed assets was the rubble of a burnt station, covered with secondary jungle, from which a small amount of salvageable plant was recovered. The station had been rebuilt, and now housed three alternators, totalling 1,260 kVA almost double the pre-war capacity. Another boiler would be erected to obtain the full rated output of the new turbo-alternator. The present demand per month had not yet reached the 1941 figure of 82,000 units, but there was a steady upward trend. He paid tribute to the work of the resident engineer and manager, Mr. A. E. Kerridge.

Difficulties at Barbados

Incensed by numerous electricity cuts, which are hampering the productivity of local industry and also exasperating housewives, the Electric Consumers Association of Barbados, recently established, has appealed to consumers to sign a petition to the Governor. The petition calls on Mr. W. A. L. Savage, the Governor, under the terms of the Act under which the Electric Supply Corporation is operating, to take early action to cause investigation into early installation of generating equipment to ensure continuous supply to consumers; supply of current of the proper voltage; and the finances of the company to be examined to ascertain the cost of producing current. The petition also calls for the appointment of a permanent Public Utilities Commission, to exercise control over such undertakings.

Rural Supplies

Proposals for the supply of electricity to border areas in accordance with reciprocal arrangements between New South Wales and Queensland were finalised at a conference at Goondiwindi last month. Mr. S. F. Cochrane, Queensland Electricity Commissioner, said the policy of the Queensland Government was to secure for border areas as cheap a supply of electricity as is available under the Government's regional scheme. The North-west County Council planned to build a modern steam generating station on the Ashford coalfield that would meet the needs of the county, and of an extensive border area in South-western Queensland. If the C.C. proceeded with its plan it could count on the co-operation of the Queensland authorities. In the meantime it was hoped that temporary arrangements would be made to give electricity to Texas at an early date.

Commission's New Building

Plans for an 11-storey building to be erected in William, at an estimated cost of £800,000, have been finalised by the State Electricity Commission of Victoria. The building, which will be 132 feet above street level, and include two basements, will be erected opposite the present head office. So far, a permit has been issued for the first stage of the work—excavation of the site and building to ground floor level.

Problem in Manitoba

The scene of the recent disastrous flooding, electrical contractors in the city of Manitoba recently held a meeting to consider the rehabilitation of all electrical installations following the flood. The meeting was called by the Manitoba Electrical Association.

Ontario's Good News

During one of his periodical visits to the Des Joachims hydro-electric scheme last month, Mr. R. H. Saunders, chairman of the Hydro-Electric Power Commission of Ontario, said that power shortage in the province was a thing of the past. Three of the Commission's post-war projects would commence to generate electricity in June, although not at full capacity. The first of the three plants to start is the Tunnel dam scheme on the Mississagi River in North-western Ontario. It is scheduled to commence operation on Wednesday next with a potential output of 56,000 h.p. A week later the Pine Portage power plant on the Nipigon River (described in our November 3, 1949, issue), will start up with 80,000 h.p., and after a further week the first two of the eight generators at Des Joachims, capable of producing 120,000 h.p., will be put into operation. By the end of this year, or early in January next, at the latest, the Des Joachims project will be working with 480,000 h.p. of plant. Referring to the Commission's change-over scheme, he said the conversion work was well ahead of schedule. Nearly 2,000,000 60 c/s motors were being purchased for installation in 25 c/s areas.

Gifts for Schools

During the course of its change-over scheme, the Hydro-Electric Power Commission of Ontario has accumulated a quantity of 25-cycle equipment which could not be readily changed for 60-cycle operation. The equipment includes motors of various sizes, as well as certain types of clocks and fans. The Commission has now offered to donate such equipment to collegiate vocational institutes and universities for use in teaching. There is, of

course, the stipulation that none of the equipment shall be sold or transferred from the possession of the school, and when the 60-cycle system operates in the present 25-cycle areas, the schools in those regions shall not ask the Commission to change over any donated item.

New Plant for Edmonton?

The Utilities Committee of Edmonton City Council, Alberta, has approved the recommendation of Mr. W. I. McFarland, plant superintendent, that a further 30 MW turbo-generator be installed at the city's power station. It is hoped that this could be in service by 1953. The offer of the Calgary Power Co. to look after the peak load during the winter of 1953-54, for the sum of $140,000, and delay the capital outlay for a further year, was rejected.

Bavarian Projects

Two large new hydro-electric power stations are to be constructed in Bavaria, in the U.S. Zone of Germany—at Sylvenstein and Rosshaupten. The Bavarian Senate has already approved the projects, and has now authorised the construction department to make available immediately an advance sum of 15 million Deutschemark from the 1950 extraordinary budget to finance the first stages of construction at Sylvenstein.

Dry Battery Industry

The Government of India has accepted the Tariff Board's recommendations on the continuance of protection to the dry battery industry. Steps have been taken to extend the protective duty of 30% *ad valorem* on imports up to 1951. The Government has also accepted the recommendation that the control over imports of dry batteries should be maintained only as long as such restrictions are necessary for consideration of foreign exchange.

New Bombay Station

Putting into commission a new power station at Chiplun in Ratnagiri District last month, Dr. Jivra Mehta, Bombay's Minister for Public Works and Housing, said it was the Government's desire to make electricity available both in townships and in rural areas. He described the general plan of grid system and electrification in the State and the big power projects undertaken.

Power Restrictions

Restriction in the industrial and domestic consumption of electricity in the Madras areas served by the Papanasam, Mettur and Pykara hydro-electric grid has been increased from 50% to 60%. This additional cut has been necessitated by the dwindling level of water in the reservoirs at these places. There is every possibility of the cut being increased to 75%, we learn.

In Mysore State, a cut of 50% on power supplies for industrial purposes in Bangalore and the Kolar Gold Fields is to continue, but with good summer showers a threatened increase has been deferred.

Economy Suggestion

In view of the expressed need for economy in electricity consumption, it was suggested at last month's meeting of the North Auckland Electric Power Board, N.Z., that the minimum amount that must be paid for the various classes of power each month be suspended while the restrictions were in force. Making the suggestion, Mr. Mackay explained that if consumers had to pay for a quantity of electricity whether they used it or not, obviously they would consume it. A report submitted by Mr. T. R. Overton, electrical engineer, and Mr. S. P. Day, secretary, showed that the cost of suspending the minimum charges upon six of the main services would be as follows: domestic £335, commercial lighting £379, commercial heating £124, electric motors £789, water heating £487, and beach cottages £121, making a total of £2,235 p.a. It was stated that with costs still rising, it was not possible to recommend any alteration in the Board's charges. If concessions could be considered in the future, such should be made to those consumers who made full use of the supply, and not to those who still desired to keep the supply but made very little, if any, contribution towards the costs of bringing and maintaining the service. The suggestion was rejected.

Plant for Lusaka

With reference to the paragraph headed "Difficulties at Lusaka," in our issue of May 4, we are asked by the Metropolitan-Vickers Electrical Co. to publish the following corrections. The order which the M.V.E. Co. has in hand is for one 1,250 kW set, not two. The order was placed in January, 1948, not May, 1947. The contract dispatch date was the end of May, 1950, and the set will be dispatched within a few weeks. With the erection time estimated at three months and allowing three months for transit, so far as the Metrovick equipment is concerned the set should be in commission about the end of this year, not in the middle of next year as the original report stated. Since the original implied that difficulties due to a boiler breakdown had been aggravated by delay in Metrovick delivery of a new generating set, the M.V.E. Co. is naturally anxious that this wrong impression should be corrected.

Plant for S.A.

The Electricity Supply Commission of South Africa has placed an order with C. A. Parsons and Co., Ltd., for two 20 MW turbo-alternators for installation at the Commission's new power station at Swartkops, Port Elizabeth.

PERSONALITIES IN THE INDUSTRY

We understand that **Mr. F. H. Flood,** A.M.I.P.E., has recently been appointed works manager to John Fowler (Leeds) Ltd. He has previously been production engineer to Crompton-Parkinson Ltd., being responsible for the production reorganisation of certain of their works.

J. H. Tucker and Co., Ltd., have appointed **Mr. W. D. James** to be responsible for their interests in the West of England and South Wales territory. He may be contacted at 17 Victoria Road, St. Philip's, Bristol.

London Transport announces the appointment of **Mr. H. E. Styles,** B.Sc., A.R.I.C., as superintendent of laboratories. In 1940 he became assistant to the chief chemist and later to the superintendent of laboratories.

Formerly chief designing hydro engineer to the New Zealand Ministry of Works, **Mr. W. A. Bloodworth** has been appointed deputy civil engineer with the State Electricity Commission of Victoria, Australia.

Mr. H. Nimmo, M.Inst.C.E., M.I.E.E., M.I.Mech.E., chairman of the Southern Electricity Board, is to act as leader of the B.E.A and Area Board's delegation which is attending the C.I.G.R.E. Conference in Paris at the end of this month.

Mr. Ellery W. Stone has been elected president of the American Cable and Radio Corporation, succeeding the late Mr. K. E. Stockton.

To succeed Mr. C. Pinkham, who is retiring at the end of this month, as we recorded last week, the General Electric Co., Ltd., has appointed **Mr. M. R. Neville,** M.C., M.A., A.M.I.E.E., as manager of their publicity organisation. Educated at William Ellis School, Mr. Neville entered Peterhouse, Cambridge, as a scholar, where he gained an honours degree in maths. After war service he joined the G.E.C. in 1919 under Lord Hirst's ex-officers' training scheme. In 1924 he joined the sales department as assistant to the sales manager, the late Mr. H. W. Roberts, and became assistant sales manager in 1933. He has always taken an active interest in the social affairs of the company, having served as secretary and being now chairman of several of the Social and Athletic Clubs.

Mr. M. R. Neville

To succeed Mr. F. Crush, the General Electric Co. Ltd. has appointed **Mr. A. White** as manager of the firm's Ipswich branch, as from July 1. Mr. White joined the G.E.C. in 1915, and on his return from war service, became assistant to Mr. Crush at Ipswich in 1919. When that sales office was given the status of a branch in 1929, he remained as chief assistant. A member of Ipswich Engineering Society and the Ipswich and District Electrical Association, he is well known throughout the Eastern Counties.

Mr. A. White

As from July 1 next, **Mr. W. A. Bennett,** B.Sc., A.M.I.E.E., now with the B.B.C., takes up his new appointment as sales manager of the Electrical Department of Turners Asbestos Cement Co., Ltd. He served a student apprenticeship with the B.T.H. Co., at Rugby and Willesden Works, and in 1928 joined that firm's Contract and Large Machine Sales Department, where he was engaged on railway and industrial electrification schemes. He went to the B.B.C. in 1936 as an assistant engineer, subsequently becoming head of the Power Section in the Planning and Installation Department, dealing with the technical aspects, specification, purchase and installation of switchgear, transformers, rectifiers, diesel engine equipment and all other power plant for the sound and television transmitting stations, studios and other premises.

Mr. W. A. Bennett

As further recognition of his outstanding services over many years to the wool textile industry, **Mr. A. R. Bains,** C.B.E., member of the Yorkshire Electricity Board, has had conferred upon him honorary membership of the Wool Textile Delegation. This distinction has been awarded only three times previously.

The gold Albert Medal of the Royal Society of Arts for 1950 has been awarded to **Sir Edward Appleton** "for outstanding services to science and industrial research."

On Thursday last, **Mr. T. H. Redfern,** chairman and managing director of Redfern's Rubber Works Ltd., was elected to the office of president of the Federation of British Rubber Manufacturers' Associations for the 1950-51 session. He was recently deputy chairman of the employer's side of the N.J.I.C. of the industry for three years, and is at present chairman of the Labour Relations Conference and a vice-president of the Research Association of British Rubber Manufacturers.

In succession to **Mr. A. G. R. Bell,** A.M.I.E.E., A.M.I.Mech.E., who has been appointed station superintendent designate at the new Bromborough power station, Merseyside and North Wales Division of the B.E.A., **Mr. A. F. Harper** has, this month, taken up duties as station superintendent at Wallasey generating station. Mr. Harper was previously shift charge engineer at Clarence Dock power station.

The Minister of Fuel and Power has appointed **Mr. J. Kent, Brig. G. Pollard,** C.B.E., A.M.I.E.E., and **Miss M. Flamank** as additional members of the South Western Electricity Consultative Council. **Mr. G. U. Fulford** has resigned from the Council.

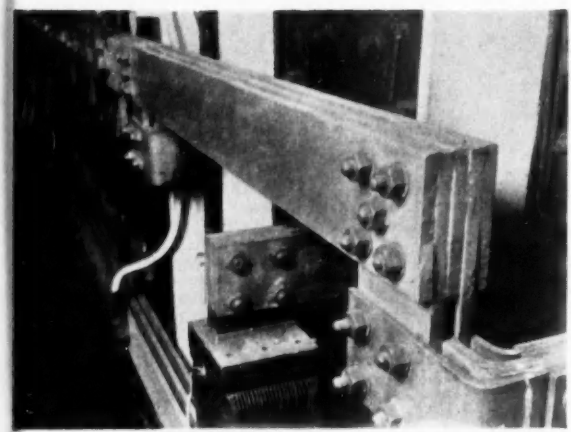
OBITUARY

The death occurred on May 30 of **Mr. Donald Allan,** London manager of William McGeoch and Co., Ltd. Until two years ago he was employed at the firm's head office at Glasgow.

We note the recent death of **Dr. H. A. Dickie,** D.S., aged 54, general manager of Research at Stewarts and Lloyds.

ALUMINIUM BUSBARS

Operating Experience in the Aquitania



A section of the original busbar arrangement showing jointing

DURING the designing of the *Aquitania*—now sold to the breakers after thirty-six years exacting service—it was decided to install busbars and connecting links in aluminium. These were supplied in metal of 99·5% purity by the British Aluminium Co. Ltd.

The main switchboard deals with the output from four 400 kW generators by a three-wire system running 220 volts across outers. The busbars concerned are 5 in. by $\frac{1}{2}$ in., each outer being made of three such bars in parallel. The length of the busbars is about 40 ft and is made up of three lengths.

Four joints are thus involved, each being of the "fishplate" type, 6 in. long and giving a contact length on each bar of 3 in. Each joint was made up without the use of vaseline and is tied with ten $\frac{1}{2}$ in. brass bolts with copper nuts. Neither bars nor joints are protected in any way.

While this system scarcely conforms with modern practice, no trouble has been experienced and little done beyond routine maintenance for the past 36 years.

In addition to this main installation there are 14 auxiliary switchboards in various parts of the ship, each using 2 in. by $\frac{3}{8}$ in. aluminium busbars. Overheating was found on some occasions due to slackening of the joint bolts; after cleaning and re-securing this trouble was eliminated.

Corrosion

Through her service in varying climates much condensation inevitably occurred, and the port side of the generator room busbars developed a heavy grey deposit due to this cause. A reassuring feature was that neither aluminium-aluminium nor aluminium-copper joints showed any sign of corrosion.

The usual life of a liner such as the *Aquitania* is about 25 years, but owing to the war the ship served for 36 years, and the last final inspection showed that much of the electrical equipment was good for many years to come.

The BUYER'S *Column*

Servo Instrumentation

OPERATING on a principle claimed to be unique in the sphere of measurement, the Fielden "Servograph" sets a new standard of accuracy for graphical recording meters.

The basis of this new instrument is a servo motorised mechanism controlled either by a moving coil, moving iron, dynamometer or electrostatic movement; the pointer of a normal movement is here replaced by a small light vane which acts as one plate of a variable condenser. Another vane arranged to be turned by the servo moves in the same arc as the meter-operated vane and the two are maintained at a constant spacing by an electronic capacitance relay which controls the servo motor. It is then only necessary to provide enough energy to deflect a normal indicating motor and the servo mechanism locates the pen arm with precision being positionally controlled by this movement.

Outstanding features of the unit are its accuracy, absence of pen troubles, portability, and response to rapid changes.

Three versions are at present available. There is a portable graph recorder for laboratory and general use (Model R.L.1) power consumption is 35 W and weight is 19 lb. An industrial model R.F.1 embodies the same principle and components but is with a dustproof cast aluminium case. And a third model R.F.1C. is exactly the same as R.F.1, but is arranged as a recorder controller.

This new unit was shown by FIELDEN (ELECTRONICS) LTD., Paston Road, Wythenshawe, Manchester, at many of the recent exhibitions and has aroused much interest.

Right: The Masterberry fire, by Berry's Electric, with log effect

Centre: Creda's new boiler has attractive modern lines

Below: The Fielden Servograph recording meter. This is the portable laboratory model

Creda do it again

REPORTS reach us that the new Creda washboiler is now available. It has been carefully designed as a labour-saving appliance for the housewife. The exterior "skin" is galvanised under its protective coating of enamel and the interior is of tinned copper so that the boiler is completely rust proof—an important point of favour in the housewife's eye.

The design is modern, its straight sides without dust traps being easy to clean and its appearance is attractive with either cream or mottled grey enamel finish.

Fitted with a tap for draining, designed to stay cool and with a light yet sturdy hinged lid, the washboiler is easily stowed under a draining board. It moves on feet fitted with domes of silence for the minimum of noise and scratching.

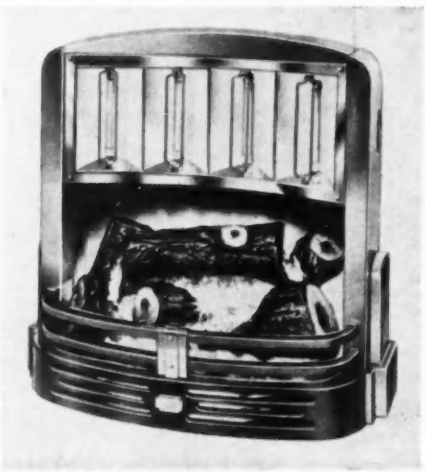
Loading is 3 kW with two switches to give 3-heat control, and the price £8 15s. The makers are, of course, the SIMPLEX ELECTRIC CO., LTD., Broadwell, Oldbury, Birmingham.

Tradition in Heating

OFFERED as an alternative to the coal effect for those who prefer the traditional open fireside "glow" yet welcome the advantages of electric heating, is the No. 444 "Masterberry" fire with logs made by BERRY'S ELECTRIC, LTD., Touchbutton House, Newman St., London W.1.

The element assembly ensures that there is a wide angle of heat radiation; it comprises four 500 W elements controlled by two recessed switches, and is highly polished.

Main frame of the fire is finished in Armour Bright, and overall dimensions, etc., are as follows:



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width 22 in., height 21½ in., depth 9 in., weight 25 lb., loading 2 kW.

New Type Welding Electrode Holders

SHEET metal welding, if it is to be of high standard, calls for apparatus which will permit easy manipulation of the light gauge electrodes which are used in this work.

Bearing this in mind, the QUASI-ARC COMPANY, LTD., Bilston, Staffordshire, have developed two new electrode holders primarily intended for this type of work.

Their simple design embodies a spring-loaded plunger which wedges the electrode in the brass barrel of the holder. This plunger is withdrawn by means of a trigger, sliding in the handle, which can be pulled easily with one finger. A small diameter handle ensures a comfortable grip for the welder. The welding cable is sweated directly to the brass handles.

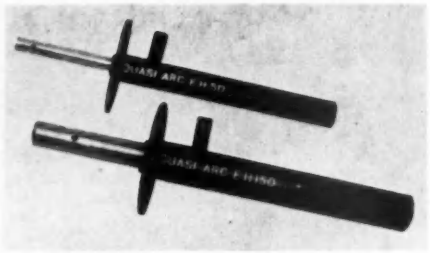
Two sizes are supplied, the smaller type EH50 weighs 5½ oz. and is designed for welding with 16 or 14 s.w.g. electrodes up to 50 amp.; the larger, EH150, weighs 12¾ oz. and is for 16 to 10 s.w.g. electrodes at currents up to 150 amp.

A Line with a Warm Welcome

A LINE which is proving a fast selling proposition for dealers is the R.E.A.L. Plinth Light which was introduced recently by ROWLANDS ELECTRICAL ACCESSORIES, Ltd., R.E.A.L. Works, Hockley Hill, Birmingham 18.

Of an elegant yet simple style the plinth light

The R.E.A.L. Plinth Light makes the picture



These are the new Quasi-Arc electrodes

is strongly constructed, the heavy glass top plate being strong enough to carry even the heaviest vase or ornament. It is softly "muffled" and obscured to give a good light diffusion. Running cost is negligible; the lamp used is a 15 watt normal filament lamp. Heat radiated is so slight that the life of the flowers will not be shortened.

The light, which is supplied normally in cream, but is also available in pastel blue or pastel rose, adds that touch of warmth and cheer to a room so necessary whilst obviating the need for physical heat.

Dimensions are: diameter at top 8 in.; diameter at base 11½ in.; overall height 2⅞ ins. Price, complete with shockproof porcelain lampholder and three yards of flexible cable is 30s., tax paid.

A Hot-Air Steriliser

SPECIFICALLY designed for the bulk sterilisation of hypodermic syringes especially in cases where hospitals form syringe banks, is the new steriliser just introduced by THERMOLECTRICS, LTD., Chapel Works, Church Street, Hampton-on-Thames, It is suitable in cases where reliable operation for long periods without attention is a major consideration. In view of its effective temperature control ranging between 35° C. and 200° C., the steriliser may be also used as a bacteriological incubator. The outer case is in sheet aluminium, in white enamel, the inner steriliser in steel also in high-grade white vitreous enamel. Shelves are of stainless steel. All controls are grouped on a facia panel affording easy operation, and the heating elements are of robust type totally enclosed in steel tubes and fitted in a bay section at the base of the unit. Loading is 3 kW for operation on standard voltage ranges, and the capacity quite adequate at 4·2 cu. ft.

Price Revisions

CONSIDERABLE increases in the price of copper which have occurred recently have compelled the POWER CENTRE CO., LTD., Wednesbury, Staffs, to revise list prices of their standard busbar chambers. Prices now range from 20s. 6d. per foot run, and 12s. per chamber for the 100 amp 3-bar type to 91s. 6d. per foot run, and 22s. 6d. per chamber for the 1,000-amp 4-bar size. These prices are quoted for busbar chambers up to 10 ft in length, prices for other lengths are supplied on request.

NEW LITERATURE

Design of Direct Current Machines

by L. Greenwood, M.I.E.E., M.I.Mech.E.

DESIGN textbooks, or the chapters on design in those volumes having a wider scope, are notoriously difficult to write because the art of designing depends so much on experience. In the present work, however, Mr. Greenwood has achieved a satisfying balance between the mass of detail, not generally applicable, which is sometimes found, and the rather vague generalities that lie on the other side of a successful treatment. He states clearly the fundamental points that have to be considered in a design, but elaborates only those that are usually most important.

Armature windings and magnetic circuits are dealt with in the first two chapters, and then Mr. Greenwood goes on to discuss armature reaction, commutation and commutation poles. Field windings and the choice of number of slots and of the winding are the next subjects, and these are followed by a consideration of heating and some notes on the mechanical details of construction. Finally overall design principles and procedure are considered, and the working out of several commercial designs is set out on typical design sheets. Curves are an obvious feature of any publication on design, and the author and the publishers are to be congratulated on the unusually clear way that these are reproduced. The book has been specifically written for senior students and junior designers, and these should find a study of its pages well worth their while. Published by Macdonald and Co. (Publishers) Ltd., 222 pages, 8½ in. by 5½ in. Price 25s.

Fair Trading Policy Revised

A NUMBER of important modifications have been made in the fourth edition of the Electrical Fair Trading Policy,* just published. To commence with, the definitions of both an electrical manufacturer and an electrical wholesaler have been somewhat amplified, while entirely new definitions of a State-owned trading organisation and a Government department are included.

Another necessary modification has been made to the general principles in that those who, by written agreement, service electrical equipment, may be allowed special discounts. The clause dealing with quantity buying terms has been amplified by the insertion of two further clauses in order to ensure equity in the operation of such terms. This section also includes, for the first time, paragraphs placing hospitals, institutions and local authorities under the category of special large buyer or recognised user, whilst the Co-operative Wholesale Societies are also regarded as in the former class.

Changes in the Schedule

In the main part of the policy—setting out the numerous schedules—there are a number of changes. In Schedule 1, references to railway companies and the L.P.T.B. have been deleted as being no longer appropriate, while an item dealing with cartridge fuses has been introduced, and other entries covering switches, and socket outlets and plugs, have been amplified.

It is noted that the discount on all types of lighting fittings supplied to garages, as defined, has been reduced from 25% to 10%. Schedule 2, covering lighting fittings, now embraces statuettes or vases and plastic shades, and two scales of discounts are operative. For individual fittings of under £5 (list), the special large buyers' discount has been dropped from 33⅓% to 20% and that of the recognised user from 25% to 10%, the latter excludes fluorescent fittings on which 15% is allowed.

In Schedule 3, dealing with industrial and commercial lighting fittings, the discount in Category I, for special large buyers, is reduced from 25% to 20%. Plastic fittings and moulded glass reflectors for shop window lighting are now included in Category II, while the discounts allowed in this and in Schedule 4 have been altered.

Additional items are included in Schedule 5—heating, cooking and domestic appliances—while water heaters have been segregated to provide a separate schedule. This has been found necessary in order to include definitions, peculiar to this schedule, for building and plumbing contractors, heating engineers and users purchasing for their own requirements. At the same time, the trade discount on thermal storage heaters has been increased from 15% to 20%. The scope of Schedule 6 has been widened to cover air-break switch- and fusegear up to 200 amp, 600 V per way, while a further new schedule (No. 12) has been included, relating to ceiling and table fans. In other modifications, air transport companies are now included amongst those to whom accumulator manufacturers may allow a 15% discount.

It is stressed that all the foregoing changes have been established in consultation with the appropriate sections of the industry. The policy is, of course, a voluntary one, operated as a code of good trading ethics.

**Published by the Electrical Fair Trading Council, Sardinia House, Kingsway, W.C.2, price 2s.*

THE WEEK IN NEWS

INDUSTRY — COMMERCE

Suspected Sabotage at Cliff Quay

CLIFF QUAY power station, Ipswich, was the scene last week of an attempt at sabotage, it was disclosed at the week-end. The B.E.A. has not issued an official statement on the matter, but it is understood that oil taps on a cooling fan system were tampered with, resulting in a minor seizure, and two of the main generators had to be taken out of service on May 31. A switchboard operator raised the alarm when checking the instruments. The trouble was rectified within a few hours, but a more severe breakdown may have occurred had it not been noted in good time. Mr. H. B. Campbell, station superintendent at Cliff Quay, has stated that the breakdown was due to "deliberate action by some person." The matter is now in the hands of the police, who are making investigations into the suspected sabotage; other precautions have also been taken. Meanwhile the official opening of the station will, as arranged, take place tomorrow, Friday.

Cable and Wire Standardisation

TECHNICAL Panel of the Engineering Standards Co-ordinating Committee concerned with cables and wires has recently issued a 1950 edition of GDES. 25: "Natural Rubber and Polychloroprene Sheathings from Electric Cables and Flexible Cords." Secretaries of the committee are the Ministry of Supply, I.E.M.E., "Aquila," Golf Road, Bromley, Kent.

Main difference from the 1948 issue is in the introduction of a tear resistance test and increase of the tensile strength requirements of general purpose natural rubber and polychloroprene compounds. There are a number of other changes. Copies can be obtained from H.M.S.O., price 3d.

Steel Distribution Records

UNDER an Order signed by the Minister of Supply, arrangements have been made for collecting statistics of deliveries of steel to the main consuming industries and for export. The new arrangements became necessary because of the ending of distribution control for general steel, announced by the Minister on May 22.

Small purchases not exceeding 5 lb per month, and sheet steel, tinplate, ternplate and blackplate are excluded from the conditions of the Order.

The Order—the Iron and Steel Utilisation (Records) Order, 1950 (S.I. 1950, No. 873)—came into operation on June 4. Copies are available from H.M. Stationery Office.

In future anyone requiring steel should include in his written order the words "Iron and Steel Utilisation Record," followed by the code letters showing the purpose for which he is acquiring the steel. Code letters are listed in the pamphlet—"Note to Consumers: May, 1950"—which explains the system, and is being distributed by Government departments to steel consumers.

"Examine B.E.A. Policy" Motion

A MOTION that the national executive council should be instructed "to examine the structure, administration and policy of the B.E.A. and Area Boards" is to be proposed by Bristol Electricity branch of the National Association of Local Government Officers at the annual conference in Eastbourne next week. The motion explains that this should be done with a view to (*a*) increasing efficiency, and (*b*) considering whether the best interests of consumers and employees are being served under the existing administration.

B.E.A. Education and Training

THE British Electricity Authority has submitted to the Minister of Fuel and Power a programme of education and training, stated Mr. Robens, replying to a question recently. The programme, which has been formulated in consultation with the Trade Unions concerned through the N. J. Advisory Council for the Electricity Supply Industry, covers a wide field and represents a substantial extension of the schemes which were in force before vesting date.

The First Half-Century

The difficulty in Great Britain remains, even if the organisation existed for producing the tools, of getting them used. An actual example will illustrate this. A large firm of brass finishers in England, having seen American automatic machines at work, decided to purchase some for their own use. A few days later, the order was cancelled. The reason for this change of policy turned out to be that the foreman, when consulted, had warned the firm that the change would be opposed by the men, that labour troubles and consequent disorganisation of business would result, and therefore the old hand methods continued.—*From our issue of June 7, 1900.*

A New "Burra-Batti-Wallah"

PRINCIPAL event of the Batti-wallahs' monthly lunch on Wednesday of last week was the installation of Mr. H. Nimmo as the new president, by Mr. Forbes Jackson, the retiring president. In his introductory speech Mr. Nimmo gave a brief resumé of his career in Rangoon as a *batti-wallah sahib* and later as a *burra batti-wallah*, with interesting reminiscences of the curing of poor commutation on ships of the British India Steam Navigation Co. in 1910-11. Having left Burma, not without regret, in 1929, it was a great pleasure to feel that he was a burra-batti-wallah again.

Owing to the unavoidable absence of Mr. Cecil Havers, K.C., who was to have been the principal guest, Colonel Wellingham sportingly stepped into the breach at very short notice, and gave a talk on "Ancient Cars." As a member of the Veteran Car Club, he had a considerable amount of interesting information to impart regarding this living museum of pioneer engineering achievement. One of his two veteran cars is a 4½ h.p. De Dion Bouton, which has been in his family since 1900. In this, he is consistently successful in the "Old Crocks' " run to Brighton, held annually to celebrate the repeal of the red-flag law in 1896. The next lunch will be held on Wednesday, June 28.

Board to Appeal

THE South-West Scotland Electricity Board has lodged a notice of appeal against the award of £52,408 made to Mr. J. Paterson, formerly general manager and director of the Clyde Valley Electrical Power Co., we understand. The appeal is expected to be heard in the Court of Sessions, Edinburgh, towards the end of this month. (We reported the award on page 616 of our April 13 issue.)

"Code of Practice" for Churches

MOST electrical contractors have at some time handled a contract for the installation or renewal of electric lighting in a church. A special type of job, church wiring presents a number of technical and aesthetic problems.

After taking expert advice, the Central Council for the Care of Churches of the Church of England has just issued revised regulations governing the lighting of all Church of England churches.

The publication is in two parts, Part I being devoted to advice to the clergy and church people concerned with the inauguration of a new lighting scheme. Part II gives regulations for contractors. The pamphlet is published for the Council by the Church Information Board, Church House, Westminster, S.W.1. Price is 4d. (by post 5d.) for Parts I and II together; price 2d. (by post 3d.) for single copies of Part II only.

Board reviews Rural Progress

"SHORTAGE of capital is now the limiting factor in S. Western Board's plans for giving new supplies to rural areas and for improving the services to existing consumers," Mr. S. F. Steward, chairman of the Board, told members of the area consultative council on Friday.

"I cannot over-emphasise the devastating effect which this is having on the momentum of the Board's development," he added. It would not be possible to carry out in full even the modest programme announced six months ago to the consultative council. Some of the parishes included in this programme would not obtain their supply during the present year."

During the past year the Board had connected 24,000 new consumers, bringing the total number of consumers in the area to approximately 553,000. Of these new consumers about 18,000 were in urban areas, including some 4,000 in Bristol, 1,500 in Plymouth and just over 1,000 in Bath. The most marked increase in the use of electricity had been in the industrial field, in which the additional 400 million units consumed represented an increase of about 10% over the previous year. In Bristol alone 207 million units were consumed, an increase of 19% over 1948-49; 310 new industrial consumers and some 8,000 kW of new load had actually been connected; and at the end of the year negotiations were proceeding for new supplies which should lead to more than double this amount of new load being added during 1950-51.

Some 6,000 new premises had been connected in rural areas, including over 800 farms. Work on the Board's rural survey of undeveloped areas had been pressed ahead during 1949-50, and by the end of the year surveys had been completed for 550 parishes, out of a total of 950.

Contrast between old gas lighting standards and new G.E.C. prismatic reflectors on Concrete Utilities columns is shown in our picture of the Orpington by-pass road with its new lighting

C.I.E.'s Diesel-Electrics

TWO 915 h.p. diesel-electric mixed-traffic locomotives with full engine, transmission and control apparatus supplied by Sulzer Bros. (London) Ltd., have just been put into service by the C.I.E. (Irish National Transport Co.). Each has a six-cylinder oil engine running at 750 r.p.m. Electrical equipment, supplied by Metro-Vick, comprises a main and auxiliary generator on the same shaft, four force-ventilated traction motors, and Sulzer's servo field regulator system of engine-generator control. The main generator has two ratings: (1) 1,100 amp, 475 volts, 700 r.p.m.; and (2) 720 amp, 750 volts, 700 r.p.m. One-hour rating of each traction motor is 350 amp, 360 volts, 255 r.p.m. Road wheels are 44 in. diameter and the gear ratio 16 : 65.

An interesting point is that the cooling fan motor and the blower motors are connected in series at engine starting, so that all three motors run at slow speed. As the controller handle is advanced the connection changes automatically to parallel, so that fan and motor-blower groups run at full speed. The servo field regulator control provides an idling notch and ten other notches each with a specific torque-speed combination.

Tractive efforts are 46,000 lb at starting, and 26,000 lb at 8¼ m.p.h. on the one-hour rating. Top speed in service is limited to 55 m.p.h. Speeds of 17 to 18 m.p.h. have been maintained up 1 in 84 grades, and 48 m.p.h. up 1 in 1,150 with 360 tons trailing, and 55 m.p.h. up 1 in 1,150 grades with 130-ton passenger trains.

New Diesel-Electric's Trial Run

A NEW diesel-electric locomotive built by the North British Locomotive Co., may soon be adopted by British Railways. Designed for medium passenger and fast goods traffic, the locomotive completed trials last week in the West of Scotland, arriving at Central Station, Glasgow, after a satisfactory run from Ardrossan.

A railway official said the initial cost was comparatively heavy but if an export demand could also be created it might be produced more cheaply on a big scale. Electrical gear is supplied by British Thomson-Houston Co., of Rugby, and the diesel equipment by Davey, Paxman and Co.

Pulling two coaches, on its tests the locomotive was understood to have reached a speed run of about 64 miles an hour. It is said to be capable of 70 miles an hour.

Business as Usual

ALTHOUGH a serious fire occurred in the moulding shop of Resinoid and Mica Products Limited, on Saturday, May 20, production is continuing, says the company. A statement issued points out that the current impression that the whole factory was gutted is quite incorrect.

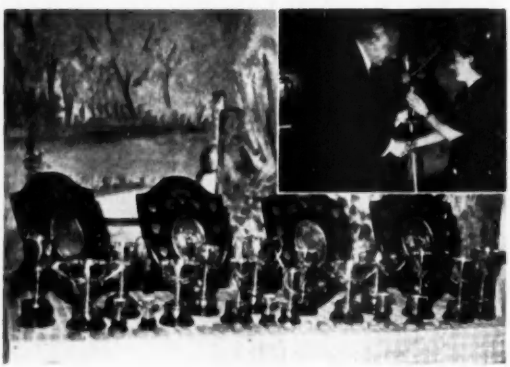
In actual fact, about 20% of the floor space was lost temporarily, but as extension space had already been provided, it has been possible to proceed with production in the mica, tube and the fabrication departments, with virtually no interruption. Some small loss of production will result in the moulding section, whilst it is being properly re-established. Within three days of the fire more than a third of the normal moulding capacity was again available.

X-Ray Inspection of Food

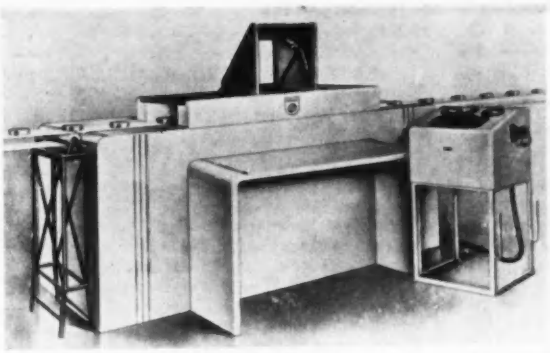
SPECIAL X-ray equipments, developed by the industrial X-ray department of Philips Electrical Ltd., are now being used in an increasing number of industries for the visual inspection of food and other consumer products.

The efficiency of this method of examination is due to the fact that it is extremely sensitive to any change of density in the otherwise homogeneous mass under examination. When, for example, a loaf of bread is being viewed, it presents a uniform image on the fluorescent screen of the equipment. If a pin is embedded in the loaf, the uniformity of the image is destroyed and the form of the pin is clearly seen as a black image due to the absorption of the X-radiation through the plane in which the pin lies.

The ability of the X-ray method for detecting foreign bodies in foodstuffs is illustrated by the results obtained from a bakery recently installed with Philips X-ray equipment. During initial trials, pieces of glass no more than ⅛ in. in diameter were detected in: 5 in flour, 6 in lard, 4 in sugar and 6 in bread. Philips X-ray equipment is also being used for the examination of such varied commodities as frozen meat, bars of chocolate, sausages, Christmas puddings, packaged cereals and a variety of pharmaceutical products.



Winners of winter tournaments were awarded these prizes at a recent dance in the works canteen of Benjamin Electric Ltd. (Inset) Mr. Guy Campbell, managing director, makes a presentation to Miss G. Topple



A typical Philips visual X-ray examination unit for use with the conveyor belt system of inspection

NEWS IN BRIEF

Sheffield now has a new Third Programme transmitter. On Tuesday the transmitter at Manor Lane School closed down and a new 1 kW transmitter with a "T" aerial near Heeley Baths commenced operation.

Exports of telegraph and telephone equipment in 1949 amounted to £602,000 to the dollar area, £10,640,000 to the sterling area, £213,000 to Belgium, Luxemburg, Belgian Congo, Switzerland and Iran, and £2,653,000 to all other countries, stated Mr. H. Wilson, President of the Board of Trade, in the House, recently.

Royal Commercial Travellers' Schools have invited Lt.-Col. M. W. Batchelor, of Batchelors Peas Ltd., to be President of Appeal for 1950.

Liverpool has just inaugurated a marine control system utilising radio telephony. Ships using the narrow channel will now be guided by instructions from ten shore stations. Altogether 150 portable transmitter/receivers have been supplied by Automatic Telephone and Electric Co., and British Telecommunications Research Ltd.

Thirty-fifth annual general meeting of Western Centre, I.E.E., will be held at the South Wales Institute of Electrical Engineers, Park Place, Cardiff, on June 12, at 6 p.m.

"Springwood," second of two diesel hopper barges which will eventually be used for disposing of ash from the new Bromborough power station on the Wirral, is undergoing speed trials on the Clyde.

The Weir closed feed system is installed in the new 24,000-ton P. and O. liner *Chusan*, with Weir regenerative condensers, turbine and electrically-driven feed pumps and an extensive patent evaporating and distilling installation.

Electric Supply News

Congleton

The Minister of Fuel and Power has made the Electricity (Area) (Congleton) Order, 1950, under which the former electricity undertaking of the Congleton Corporation, previously vested in the Merseyside and North Wales Electricity Board, has been transferred to the area of the Midlands Electricity Board.

Dundee

At the recent meeting of the T.C. the proposal that Corporation rent collectors should resume collecting weekly electricity payments from municipal tenants was commented upon by the Town Clerk. He said the secretary of the North of Scotland Hydro-Electric Board had written that the Board was willing to allow the Corporation to make the collection for them, but they were not prepared to pay anything for this service. According to the City Factor, that arrangement would involve expenditure of about £750 in commission to the collectors, and in addition there were two clerks whose job was to record 8,000 weekly payments. Their salaries would approach £800 a year. The matter was remitted to a consultative committee to take up with the Board.

Durham

Farmers in the North-East area are demanding a speeding up in the programme for supplying electricity to rural areas. Mr. W. Weightman, chairman of Durham County Farmers' Union, has pointed out that the electrification scheme in the North-East was falling behind requirements, and a speeding-up of electrification was necessary if farmers were to produce the maximum amount of food. He stated that 346 farms were supplied with electricity in the North-East last year, but this was not considered a satisfactory figure. At a meeting of Stockton Farmers' Union one farmer stated he had been asked to pay £1,000 for supplying power to his farm, and the Electricity Board had asked for a guarantee of £5 a month for electricity used. It was stated that the F.U. would not support the idea of its members paying high capital charges.

Kilmarnock

The South-West Scotland Board has given notice that it is intended to change over the supply in Kilmarnock from d.c. 240/480 V to a.c. 240/415 V.

Seaham

The Urban Council has asked the North-Eastern Electricity Board to sign an agreement forthwith, regarding the payment of a commission to the Council for collecting the electric domestic-tariff from Council house tenants for the Board.

When the Council's electricity system was taken over, the Council agreed to collect the tariff, subject to a formal agreement on the payment of a commission. No agreement on this point has yet been reached.

Southampton

Investigations are being made in the Marchwood area to acquire a 120-acre site for the erection of a new generating station. The matter was raised again at the recent meeting of the New Forest District Council, when the chairman stated that under the proposals, the buildings would be 120 ft. high with chimneys 280 ft. tall. Some 4,000 tons of coal a day would be consumed by the station, needing a dump of about 250,000 tons.

Wallasey

To replace the E.E.Co. alternator at Wallasey power station which was badly damaged when a rotor end bell failed a couple of months ago, a 12.5 MW Parsons alternator is being transferred from the Percival Lane station. The h.p. and l.p. spindles of the E.E. turbine are being despatched to the makers for examination and the renewal of certain blade rings. In order to put into commission an obsolete 5 MW Brush turbo-alternator at this station, arrangements have been made with the North Western Division to utilise the rotors and internals of a similar set now being discarded at Stockport power station.

LIGHTING SCHEMES

Bradford.—The Corporation has been recommended to approve a scheme for the provision of electric street lighting at Buttershaw "A" housing estate, at a cost of £2,708.

Enfield.—The U.D.C. is to invite tenders for an amended scheme for improved lighting on the Great Cambridge Road, at an estimated cost of £11,400.

Hornchurch.—The Council has made application to borrow £1,500 to provide lighting in certain roads in the Rainham area.

Stalybridge. The Market, Baths, Lighting and Town Hall Committee has approved a scheme for improved lighting in Mottram Road, Portland Place and Stamford Street, at an estimated cost of £1,490.

POWER STATION EFFICIENCIES

The final thermal efficiency figures of steam-powered stations during 1949, just issued by the B.E.A., shows a number of changes from the results for 1948. The Battersea "B" station has wrested from Fulham the honour of the highest overall thermal efficiency for the year, with a new high figure of 28·81%, while Kearsley has jumped from eleventh place (24·90%) to the joint third position, with Hams Hall "B."

The following are the twenty steam stations with the highest overall thermal efficiency for 1949:

Battersea "B"	28·81%	Earley	25·38%
Battersea "A" and "B" ...	26·72%	Mexborough ...	25·29%
Fulham ...	26·49%	Little Barford	25·13%
Kearsley* ...	26·36%	Meaford ...	25·13%
Hams Hall "B"	26·36%	Kirkstall* ...	25·01%
Llynfi	26·09%	Ferrybridge* ...	24·97%
Battersea "A"	25·89%	Littlebrook "A"	24·79%
Dunston "B"	25·80%	Newport* ...	24·79%
Barking "B" ...	25·61%	Trafford ...	24·72%
Brimsdown "A"	25·49%	Rotherham ...	24·71%
		Clarence Dock*	24·44%

* Only high pressure section of station taken into account.

Stations which were not in operation throughout the year but which had high thermal efficiency during their working period were:

Littlebrook "B" (commissioned 31/8/49)	26·85%
Brimsdown "B" (closed down May to Sept.)	26·13%
Cliff Quay (commssioned 22/3/49) ...	26·03%
Stuart Street h.p. (commissioned 27/6/49)	25·71%

Company Activities

Anglo-Portugese Telephone Co.

For 1949, revenue from subscribers rentals, etc., was £923,974 (*£826,890*), plus sales, removals, etc., £10,472 (*£10,259*). Working expenses £788,231 (*£711,565*), directors' fees and remuneration £14,117 (*£12,978*), to interest on Debenture stock loan and sinking fund, £137,316 (*£122,121*). To interim 3% and final Ordinary 5% £52,772 (*same*) and 8% on Ordinary "A" £4,400 (*same*), leaving £49,893 (*£46,033*) carried forward.

Automatic Telephone and Electric Co.

Group net profit for 1949, before taxation, was £1,192,899 (*£818,959*). U.K. taxation absorbs £632,508 (*£448,533*), overseas tax £19,382 (*£16,895*), leaving net profit of £541,009 (*£353,531*) all applicable to holding company, to which is added taxation provision no longer required £49,223 (*£2,586*), making available £590,232 (*£356,117*). To preliminary expenses written off nil (*£3,095*), capital issue expenses written off £21,453 (*£36,363*), to general capital reserve nil (*£183*), to revenue reserves, general £171,873 (*£153,449*), investments £26,753 (*nil*), stock £175,000 (*nil*), scientific research £47,999 (*nil to reserve but £44,627 charged as provision out of 1948 profits, before arriving at aforementioned £818,959*). Dividends paid and final 7%, plus bonus 2½% (*same*) on increased ordinary capital, making 12½% (*same*), and 10% and cash bonus 2½% (*same*) on deferred, absorbs £117,992 (*£96,230*), leaving £304,207 (*£275,045*) carried forward.

British Thermostat Co.

The consolidated profit and loss amount for the year to January 31 last shows a trading profit of £324,446 (*£341,467*), plus interest £2,370 (*£500*), transfer fees £31 (*£39*) and profit on sales of plant £113 (*£192*), making £326,960 (*£342,198*). To

directors' fees and remuneration £18,486 (*£20,040*), depreciation, etc., £29,981 (*£23,616*), leaving net profit before taxation £278,493 (*£296,920*), plus balance of undistributed profits £163,787 (*£97,848*) and taxation provision in respect of previous years no longer require £23,408 (*nil*), making available £465,688 (*£394,768*). Profits tax absorbs £37,000 (*£38,500*), income tax £111,250 (*£119,381*), to general reserve £50,000 (*same*), preference dividend £4,500, dividends on ordinary and founders' shares £45,000, leaving balance carried forward £240,213 (*£163,787*).

Sydney S. Bird and Sons

Group trading profit for 1949 was £29,251 (*£25,957*). Directors' remuneration absorbs £8,016 (*£5,604*), audit fee £315 (*£300*), depreciation £6,636 (*£6,355*), profits tax £2,750 (*£2,803*), income tax £5,700 (*£5,627*), leaving £5,834 (*£5,628*), all of which is included in the accounts of the parent company. With £9,614 (*£9,421*) brought in, and provision for taxation no longer required, nil (*£4,500*), making available £15,448 (*£19,189*). To general reserve, nil (*£5,000*), employees' benevolent fund £1,000 (*same*), dividend 12½% (*10%*), £4,469 (*£3,575*), leaving £9,979 carried forward.

Brazilian Traction Light and Power Co.

Consolidated gross earnings for 1949 was $123,884,473 ($*101,945,202*), plus other income, making a total of $124,365,701 ($*102,178,567*). To operating expenses, including tax, $79,113,245 ($*63,754,132*), depreciation $*8,843,419* ($*8,136,196*), amortisation $1,000,000 (*same*), leaving net revenue before capital charges $35,409,037 ($*29,288,239*).

G. N. Haden and Sons

For 1949, consolidated profit was £170,734 (*£161,646*). Depreciation takes £4,964 (*£5,848*), directors' emoluments £23,687 (*£20,765*), audit fee £805 (*£576*), balance £141,278 (*£134,457*). With £175,527 (*£143,669*) brought in, and investment income £2,324 (*£3,199*), there is £319,129 (*£281,325*) available. To taxation £76,900 (*£68,141*), proportion of profits applicable to outside shareholders £369 (*£441*), expenses of Preference issue, less premiums, £12,057 (*nil*). Loss on sale of subsidiary company, £122 (*nil*), written off investments nil (*£15,000*), general reserve £12,865 (*nil*). Preference dividends £3,480 (*£1,197*), Ordinary dividend 12½% on doubled capital £21,019 (*same*), leaving £193,317 carried forward.

Heatrae Ltd.

For the year to February 28 last, there was a loss of £246. With £14,755 brought in there is £14,509 available. To directors' remuneration £3,884 (*£4,979*), audit fee £262 (*same*), employees' pension fund £3,397 (*£3,171*), depreciation, etc., £787 (*£1,751*), taxation nil (*£12,103*). To Cumulative Preference dividend £825, Ordinary 12½% £3,438, leaving £10,246 carried forward.

Lightfoot Refrigeration

For 1949, trading profit was £82,655 (*£84,143*), including £8,859 in respect of previous year. Add dividend receivable from subsidiaries £3,705 (*£687*), less amount transferred to investment account being dividend paid out of pre-acquisition profits £18 (*£687*). Depreciation of fixed assets £14,026 (*£15,325*), taxation £36,109 (*£42,887*), reserve for contingencies, nil (*£4,616*), general reserve £25,000 (*nil*), reserve for vehicle replacement £1,500 (*same*), Preference dividend £2,200, Ordinary interim 3% £4,421, and final 5% £7,367 (*all same*), leaving £31,035 (*£35,316*) carried forward. Consolidated trading profit is £116,621 (*£134,066*), less depreciation £19,166 (*£21,391*), taxation £52,056 (*£64,691*), leaving £45,399 (*£47,984*), of which £7,391 (*£9,051*) is attributable to outside shareholds of subsidiary company and £571 (*£7,673*) proportion of subsidiary's profits earned prior to acquisition of additional shares.

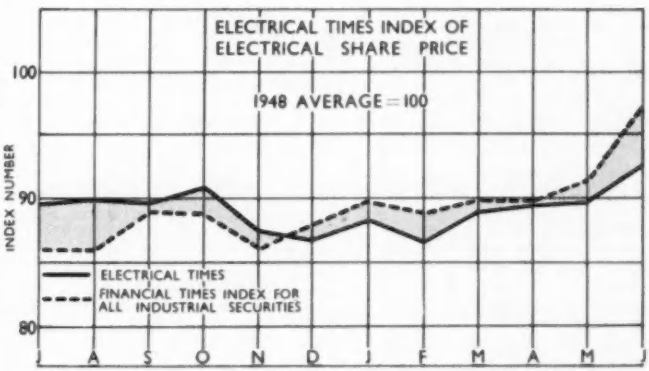
Dividends Declared

T. Clarke & Co. The dividend noted last week (*final 5%, making 10%*) is tax free.

Crompton-Parkinson. Interim dividend of 3¾% (7½%) on double capital, payable on June 30.

Vactric Ltd. Dividend on the £70,410 6% Cumulative Preference shares has been passed.

Both the "Financial Times" share price index and the "Electrical Times" index of electrical shares showed a considerable rise during May. Actual figures on June 1 show the "Financial Times" index as 96·8% of the 1948 average, while our index, calculated on the same basis, rose to 92·6%.


ELECTRICAL TIMES INDEX OF ELECTRICAL SHARE PRICE
1948 AVERAGE = 100
INDEX NUMBER
100
90
80
ELECTRICAL TIMES
FINANCIAL TIMES INDEX FOR ALL INDUSTRIAL SECURITIES
J A S O N D J F M A M J

Commercial Information

CONTRACTS OPEN

HOME

June 9.—East Ham T.C. Supply and erection of standards, electrical lamps, lanterns and electrical equipment on East Ham-Barking By-Pass road. F. C. Ball, Borough Engineer and Surveyor, Town Hall, East Ham, E.6. Deposit £2 2s.

June 9.—Manchester T.C. Rewiring of electrical installation at the Margaret Barclay Residential School for Crippled Children, Mobberley Hall, Mobberley, Ches. City Architect, Town Hall. Deposit £1 1s.

June 9.—Manchester T.C. Electrical installations required in connection with the erection of 7 shops, 7 maisonettes, and 7 garages at each of the following sites, for (*a*) Baguley Hall West Sub-centre, Bowland Road; (*b*) Newall Green South Sub-centre, Greenbrow Road, Wythenshawe. City Architect, Town Hall. Deposit £1 1s.

June 9.—Rineanna. Supply and erection at Shannon Airport of one 100 kVA electric generating plant, for Department of Industry and Commerce. J. V. Tierney, Consulting Engineer, 15-16 Duke Street, Dublin. Deposit £1.

June 9.—Sheffield T.C. Electrical installation in 100 aged persons' flats on Manor Park estate; 16 aged persons' flats on Richmond estate; 44 terrace houses on Manor Park estate; and 41 terrace houses on Littledale estate. Town Clerk, Town Hall, Sheffield 1. Deposit £1.

June 9.—Windsor R.D.C. Electrical work for improvement to 30 houses in the parish of Sunningdale, Building Surveyor, Council Offices, Bowden Road, Sunninghill.

June 10.—Clyde. Supply of electrical stores for navigation trust. Stores Superintendent, No. 1 Graving Dock, Govan.

June 10.—Dornoch T.C. Electrical work for 18 houses at Bishopfield site. Burgh Surveyor, Dornoch.

June 10.—Evesham T.C. Electrical wiring of 219 houses on several estates. Borough Treasurer, Municipal Offices, Evesham.

June 10.—Newton Abbot U.D.C. Installation of electrical wiring and fittings for 60 houses on the Buckland housing estate. Surveyor: C. Lunn, 18 Devon Square, Newton Abbot.

June 12.—Bury T.C. Electrical installations in Elton nursery school. Borough Engineer, Town Hall, Bury. Deposit £1 1s.

June 12.—Bury T.C. Electrical installations at Market Hall, Borough Engineer, Town Hall, Bury. Deposit £2 2s.

June 12.—Leslie T.C. Electrical work for 24 houses at Prinlaws site, Leslie. A. D. Haxton and Watson, Architects, Leven.

June 12.—New Windsor. Electrical installation to 30 houses to be erected on Imperial Road site. Borough Engineer, Kipling Memorial Building, Windsor. Deposit £1 1s. (See our May 11 issue.)

June 13.—Dublin T.C. 100 cast-iron electric lamp standards for street lighting. Deputy City Engineer, 28 Castle Street, Dublin.

June 13.—Leeds T.C. Supply of electric lamps. General Manager, 1 Swinegate, Leeds 1.

June 13.—Newbiggin-by-the-Sea U.D.C. Electrician's work for 26 houses on Spital Farm housing site. Engineer and Surveyor, Council Offices, Front Street, Newbiggin, Northumberland. Deposit £2 2s.

June 14.—Dublin. Electrical installation at Garda depot, Phoenix Park, for Public Works Commissioners. Office of Public Works, Dublin. Deposit £1.

June 14.—Wiltshire C.C. Electrical engineering tools for Chippenham section of N.W. Wilts college of further education. P. A. Selborne Stringer, Clerk, County Hall, Trowbridge.

June 17.—Sale T.C. Electrical installation in 34 dwellings on Baguley Lane estate No. 2. Borough Surveyor, Town Hall, Sale. Deposit £2 2s.

June 17.—Wolverhampton T.C. Two 4 cu ft side-loading electric waste food collectors with hand-operated tipping gear and sliding covers. J. Brock Allen, Town Clerk, Town Hall, Wolverhampton.

June 19.—Glossop T.C. Electric lighting, special stage lighting, and ventilation for Victoria Hall. Geo. Faulds, Borough Surveyor, Municipal Buildings, Glossop. (See our May 25 issue.)

June 19.—Slough T.C. Provision of 50 pre-cast concrete columns, 35 lanterns with 80-watt mercury vapour lighting equipment and erection of 35 columns and equipment. Borough Engineer, Town Hall, Slough, Bucks. Deposit £1 1s. Advertised in this issue.

June 21.—Featherstone U.D.C. Duplicate automatic electrically driven pumping installations capable of discharging 600 gallons per minute for waterworks pumping plant. Surveyor and Water Engineer, Council Offices, Featherstone, Pontefract. Deposit £2 2s.

June 21.—N. Scotland H.E. Board. 132 kV double circuit steel tower overhead line (approx. 65 miles route length) between Boat of Garten (Inverness-shire) and Aberdeen. Merz and McLellan, 39 Northumberland Street, Edinburgh 3. Deposit £2 2s. (See our May 11 issue.)

June 23.—Belfast T.C. 33 kV oil-immersed reactor of non-ferrous shielded type required in connection with harbour power station extensions. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (See our June 1 issue.)

June 24.—Stretford T.C. Lighting of drawing office and lecture room at Stretford Technical College by installation of fluorescent tubes. A. H. Perry, Borough Surveyor, Town Hall, Stretford. Deposit £2 2s.

June 27.—Alcester R.D.C. Wiring 33 houses in various parishes Surveyor, Council Offices, Alcester.

June 30.—N. Scotland H.E. Board. 32 miles of 33 kV and 58 miles of 11 kV single circuit wood pole overhead lines and 77 miles of low voltage lines between Huntly and Ballater in Aberdeen county. Merz and McLellan, 39 Northumberland Street, Edinburgh 3. Deposit £1 1s. (See our May 25 issue.)

July 3.—Newcastle-on-Tyne E.C. Electric lighting, power and floor heating installation valued at more than £10,000 in Hilton primary school. G. Kenyon, City Architect, Education Section, 18 Cloth Market, Newcastle. Deposit £5 5s. (Applications by June 14.) Advertised in this issue.

July 17.—Waterford C.C. Electrical services comprising lighting, cooking, laundry, sterilising and associated hospital equipment at Ardkeen Sanatorium. Fourteen major buildings, covering 20 acres. Engineer, N. Matthews, 104 Grafton St., Dublin. Deposit £15 15s.

July 24.—Bootle. Manufacture and erection of pumping plant in Hapsford Road Pumping Station, including two sets of electrically driven unchokeable pumps, each capable of 1,000 gallons per minute, for Rimrose Brook Joint Sewerage Board. Engineer to the Board, G. M. C. Taylor, Artillery House, Artillery Row, Westminster, S.W.1. Deposit £5.

July 31.—Thame U.D.C. Two electrically driven vertical spindle borehole type pumps with ancillary equipment. Engineers: John Taylor and Sons, Artillery House, Artillery Row, Westminster, S.W.1.

No date stated.—Bath. Electrical installation in new operating theatre block at Royal United Hospital, for Hospital Management Committee. Architects, A. J. Taylor and Partners, 4-5 Bridge Street, Bath. Deposit £2 2s. (Applications by July 1.)

No date stated.—Ledbury U.D.C. Provision and erection of 25-ft concrete standards and 250-W mercury discharge lamps on Newport-Worcester trunk road, A.449. Engineer and Surveyor, F. J. East, Council Offices, Church Street, Ledbury.

No date stated.—Aberdeen T.C. Electrical work for erection of lavatory block, etc., at High School for Girls. J. A. O. Allan, Ross and Allan, Architects. 10 Bon Accord Square, Aberdeen.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

June 26.—Damascus. Private branch telephone exchanges for automatic areas, desk sets with dial, battery sets, main and extension telephone apparatus with dial and magneto generator. Director General Syrian Posts, Telegraphs and Telephones, Damascus. B.o.T. (Ref. CRE (IB) 54649/50).*

June 28.—Brussels. Wires and cables, including enamelled, cotton covered, lead covered, rubber insulated and P.V.C. covered to specification. Regie des Telegraphes et des Telephones. B.o.T. (Ref. CRE (IB) 55199/50).*

Aug. 3.—Western Australia. Pumps, motors and electrical gear for two pumping stations on the Wellington Dam to Narrogin pipeline. Agent General for Western Australia, Savoy House 115-116 Strand, W.C.2.

Aug. 30.—Queensland. Three sets of turbo-alternators for Capricornia, Townsville and Wide Bay regional electricity boards. Secretary, State Electricity Commission, Scottish Union House, Eagle Street, Brisbane. B.o.T. (Ref. CRE (IB) 52721/50).*

Sep. 1.—Montivideo. Telecommunication measuring equipment. Direcion General de Communicaciones, Montevideo, Uruguay. B.o.T. (Ref. CRE (IB) 54231/50).*

Sep. 6.—Wellington. One 5-ton and nine 2-ton overhead electric cranes. Chief Engineer, Wellington Harbour Board, Wellington.

Sept. 28.—Buenos Aires. Electromechanical plant for "Colonia Sarmiento" h.e. power station in the military zone, Comodore Rivadavia. Argentine Ministry of Industry and Commerce. Ref. No. 153/50. Direccion de Talleres y Suministros. Calle Lavalle 1556, Buenos Aires.

Sept. 28.—Buenos Aires. Materials for hydro-electrical central station at Colonia Sarmiento, including gratings and sluices in the turbine chambers and accessories; sluices in the union channel for the rapid discharge; back discharge floodgate of the charging chamber; floodgates of the discharge chamber; two turbine and generator groups (3-phase, a.c. 50 c/s, 380 V); transformer station; control panels for the hydro-electric and transformer stations; electrical installation for internal and auxiliary services; spares; crane bridge from hydraulic central; repair shop; assembly; trials; instruction of staff; plans for the foundation for the machines, transformer station and proposed installations, and the building for the hydraulic central. Directorate General of Water and Electrical Power, Buenos Aires. B.o.T. (Ref. CRE (IB) 53997/50).

Oct. 4.—Wellington. Four 3-ton electric semi-portal wharf cranes. Chief Engineer, Wellington Harbour Board, Wellington.

Your Queries Answered

"Trix" mixer, makers of? T.E.—Trix Electrical Co., Ltd., 1/5 Maple Place, Tottenham Court Road, London, W.1. (18201)

"C and R" flashing lampholders, makers of? T.E.—C and R, 197 Lower Richmond Road, Richmond, Surrey. (18159)

Sleeving, fibreglass, silicone varnished, makers of? T.E.—West Insulating Co., Ltd., 1 St. Annes Chambers, Abbey Orchard Street, London, S.W.1; Spicers, Ltd., 19 New Bridge Street, London, E.C.4. (18204)

"Crosley Shelvader" refrigerator, agents for? T.E.—A. J. Balcombe Ltd., 52/58 Tabernacle Street, London, E.C.2. (18209)

"Empire" drink mixer, makers of? T.B.—Gaskell and Chambers (London), Ltd., 109 Blackfriars Road, London, S.E.1. (18213)

"Clyde" clocks, makers of? T.E.—British and Foreign Agencies, Colvern Street, Bridgeton, Glasgow. (18218)

"Waco" precision drilling machine, makers of? T.E.—Walter Machines, Ltd., 3 Kings College Mews, London, N.W.3. (18224)

The above are selected from questions we have answered this week. If you have a query, send it to us.

CONTRACTS PLACED

B.E.A. During the past month, contracts placed for power station, switching and transforming station and transmission equipment amount in aggregate to £3,620,120.

Principal contracts include: Barking "C" power station, two 377-ft reinforced concrete chimneys (Tileman and Co., Ltd.); East Yelland power station, near Barnstaple, 132 kV, 2,500 MVA switchgear (British Thomson-Houston Co., Ltd.); Chadderton power station, Oldham, Lancs, foundations, circulating water ducts and pipe bridge (M. J. Gleeson, Ltd.); Huncoat power station, Accrington, superstructure (J. Jarvis and Sons Ltd.).

Kingston power station: cable contract, Barking-Ilford, 132 kV, 33 kV and auxiliary cables, Barrow-Windscale; Oldbury, Worcs.: 132 kV overhead lines (British Insulated Callender's Cables Ltd.); Portsmouth: 132 kV and multicore cables (Enfield Cables Ltd.); Grimsby substation: 45 MVA 132/33 kV transformers and earthing transformers (Fuller Electrical and Manufacturing Co., Ltd.); Sowerby Bridge substation, Yorks.: 30 MVA 132/33 kV transformers and earthing transformers (Hackbridge and Hewittic Electric Co., Ltd.); Newcastle-under-Lyme substation, Staffs.: 60 MVA 132/33 kV transformers and earthing transformers; and Thornhill substation, Yorks: 45 MVA 132/66/33 kV transformers and earthing transformers (English Electric Co., Ltd.).

Sale substation, Cheshire: 45 MVA 132/33 kV transformers and earthing transformers (Metropolitan-Vickers Electrical Co., Ltd.); Cheltenham-Gloucester: 132 kV overhead line (Riley and Neate Ltd.); and Lockleaze substation, Bristol: 60 MVA 132/33 kV transformers and earthing transformers, Boston substation, Lincs.: 30 MVA 132/33 kV transformers and earthing transformers; and Altrincham substation: 45 MVA 132/33 kV transformers and earthing transformers (Ferranti Ltd.).

Cheltenham T.C. Electrical installations to 42 flats on Rowanfield Road estate. J. Hearson and Co., Ltd.

Mackay City Council (Queensland, Australia). Six 500 kVA 33,000/11,000 V, three phase transformers fitted with on load tap changing gear. Gresham Transformers, Ltd.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	186 0 0	£180 0 0
Delivered in 2nd and 3rd month after order	187 10 0	—
Delivered in 4th, 5th and 6th month after order	189 0 0	—
LEAD, good soft pig (foreign)	96 0 0	96 0 0
" " " " "English" quality	97 10 0	—
Delivered in 2nd and 3rd month after order, plus	1 0 0	—
TIN (99-99.75%) (Cash)	604½-605	—
" (3 months)	605½-606	—
ALUMINIUM, commercial purity (del.)	112 0 0	—
ZINC	123 10 0	116 0 0
ARMOURING		
Galv. Steel Wire (0.104 in.)	42 15 0	—
Mild Steel Tape (0.04 in.)	26 0 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Worth Electrical Services Co., Ltd. Pursuant to Sections 290 and 341(1)(b) of the Companies Act, 1948, a general meeting of the company is to be held at 29 Randall Road, Leatherhead, at 10 a.m. on Saturday, July 1, to receive liquidator's account of winding up.

A. F. Olpin, Ltd., electrical contractor, 19 Buckingham Vale, Clifton, Bristol 8. Mr. E. E. Burridge, 70 Park Street, Bristol 1, appointed liquidator on May 18.

BANKRUPTCY ACTS
Receiving Orders

Bird, Roach and Co. (electrical contractors), 3a Cheval Place, Knightsbridge, London S.W.7. First meeting of creditors of the above was held on May 26 at London Bankruptcy Buildings, Carey St., W.C., when the estate was left in the hands of the Official Receiver as trustee.

Newcastle-on-Tyne. S. I. Rae, electrical contractor, 5 Ashburton Road, Gosforth, carrying on business at 1 Ashburton Road, under the name of "S. I. Rae." Receiving order dated May 22.

Companies Winding-Up

The Maida Vale Electric Co., Ltd. (manufacturers of electric irons), 85 Wornington Rd., North Kensington, London, W.10. First meeting of creditors was held at the offices of the Board of Trade, Inveresk House, 346 Strand, London W.C.2, on May 30. No statement of affairs was filed and as there was no quorum, the meeting was adjourned.

TRADE NOTES

Agents. — Rapid Magnetting Machines, Ltd., have appointed John S. Young and Co., Ltd., 257-261 Eglinton Street, Glasgow, C.5, as their agents for Scotland.

Annual Holidays.—The works of British Insulated Callender's Cable, Ltd., will be closed for the receipt of goods during the following periods: Anchor Works, Leigh, July 8-15; Prescot Works, Helsby Works, Huyton Quarry Works and Melling Works, July 29-August 7, and Willenhall Foundry from July 29 to August 8, inclusive. A skeleton staff will be on duty to deal with customers' urgent requirements. Erith Works, Belvedere, will not be closed, as holidays are staggered.

Acquisition.—Platers and Stampers, Ltd., makers of "Prestige" pressure cookers and other lines, have purchased, subject to completion of contract, the buildings, plant and machinery of Moffats, Ltd., of Blackburn. We understand that Moffats, Ltd., will continue to produce electric cookers, etc., for the home market, probably at another works. Their appliances for overseas markets are being manufactured by plants in a number of countries.

Cables.—Belco London, Ltd.,65, Buckingham Gate, S.W.1, are now factors for Pyrotenax and C.M.A. cables.

Change of Title.—The name of Victor H. Iddon, Ltd., has been changed to Nettle Accessories, Ltd.

Metal Prices.—The Ministry of Supply raised the price of electrolytic copper by £16 to £186 a ton, with effect from June 6. As from June 4 the price of good ordinary brand zinc was increased by £12 to £123 10s. a ton delivered.

BUSINESS PROSPECTS

HOME

Alcester R.D.C. Erection of 8 houses. Architects, F. B. Andrews and Son, 95 Colmore Row, Birmingham.

Alnwick R.D.C. Approved plans by W. Gibson, mining engineer, Swarland House, Amble, on behalf of N.C.B. for locomotive sheds, workshops and stores at Shilbottle Colliery.

Arundel T.C. Erection of 22 houses at Pearson Road scheme. Architect, T. Greenfield, "Newstead," Midhurst, Sussex.

Batley T.C. Erection of 72 houses and bungalows on Staincliffe estate. Borough Engineer, West House, Hanover Street, Batley.

Cannock R.D.C. Erection of 12 houses at Hilton Lane, Great Wyrley. Gran and Ballinger, 15 Bridge Street, Walsall.

Cardiff T.C. Erection of 16 bungalows at No. 6 site, Fairwater. City Surveyor, City Hall, Cardiff.

Cumberland. Cumberland and North Westmorland Committee of the Newcastle-on-Tyne Regional Hospital Board are to carry out the following schemes: Improvements to the General Hospital, Carlisle; new orthopaedic and tuberculosis hospital at East Cumberland; new general hospital (300 to 500 beds) at Hensingham to serve West Cumberland; extensions to Cumberland Infirmary, Carlisle; extensions to Garlands Hospital; and extensions to the Dovenby Hall Hospital.

Darlington. M. of E. has approved schedules of accommodation proposed by the E.C. for the proposed engineering, buildings, and applied science block at Darlington Technical College. T.C. has applied to the M.H. for sanction to borrow £270,300 for the erection of the Hummersknott estate girls' high school: £48,500 for the erection of 26 "Z" type houses at Haughton South; £35,632 for 32 two-bedroomed flats at Haughton South; and £26,845 for 24 two-bedroomed terrace houses at Haughton South. North of England School Furnishing Co., Ltd., are to extend their canteen at East Mount Road. Bussey and Armstrong, builders, Brinkburn Road, Darlington, are to erect five houses in Swaledale Avenue. Darlington Forge, Ltd., are to build fettling shop in Cleveland Street. Whessoe, Ltd., are to extend their fitting and plate shop.

Ebbw Vale U.D.C. Erection of 56 houses on hill top site No. 9 (Part III). Architect, J. Leslie Thomas, Council Offices, The Walk, Ebbw Vale.

Glasgow T.C. Erection of 416 flats at Milton and 267 flats at Berryknowes Road. Office of the Subscriber (Public Office), or W. Kerr, Town Clerk, City Chambers, Glasgow.

Huyton-with-Roby D.C. Erection of 96 houses on St. John's Road, East site. H. K. Pilkington, Engineer and Surveyor, Council Offices, Derby Road, Huyton.

Ince-in-Makerfield U.D.C. Erection of 30 dwellings at Petticoat Lane housing site, Makerfield. Engineer and Surveyor, R. Lewis, Town Hall, Ince.

Newcastle-on-Tyne E.C. Scheme for installing electricity, in place of gas, in eight local schools, will cost £17,500 compared with the original estimate of £10,883. A supplementary estimate to cover the increase is to be provided.

Newcastle-on-Tyne T.C. Applied for sanction to borrow £403,842 for building three new schools: Montagu estate primary school (architects, P. L. Browne, Son and Harding, Pearl Buildings, Newcastle); Benton Park primary school (architect, C. S. Errington, 46 Grainger Street, Newcastle) and Blakelaw estate secondary modern school for girls (City Architect, 18 Cloth Market, Newcastle). First two schools will be prefabricated and the third of traditional construction.

Newark R.D.C. Erection of 12 houses at Collingham. Architects, Wm. Saunders and Partners, 24 Castle Gate, Newark-on-Trent.

Northumberland. C.C. approved preliminary sketch plans for Longbenton, Seaton Burn county modern school to cost £127,000 and to accommodate 450 boys and girls. Architects are Cackett, Burns, Dick and McKellar, 21 Ellison Place, Newcastle-on-Tyne.

Ogmore and Garw U.D.C. Erection of 20 traditional type houses at Blackmill. W. T. Harris, Engineer and Surveyor, Council Offices, Brynmenyn, near Bridgend.

Oswestry R.D.C. Erection of 10 traditional type houses and works in connection at Whittington. Architect, S. T. Walker, 83 Suffolk Street, Birmingham 1.

Rhayader R.D.C. Erection of four two-bedroom dwellings at Rhayader. H. F. Hartwright, Clerk, Council Offices, Rhayader.

Saltash T.C. Erection of 15 pairs of houses on Warraton site. Borough Surveyor, Mr. A. de Barr, Church House, Saltash.

Southwell R.D.C. Erection of 28 houses on Council's housing site between Forest Road and Walesby Lane. Surveyor, S. Cooper, 8 Westgate, Southwell.

Stanley (Co. Durham). The U.D.C. has agreed to take over the New Kyo Miners' Hostel for adapting into housing accommodation for 70 families. The U.D.C. Surveyor is J. R. Heslop.

OVERSEAS

Colombia. Rueda Osorio y Cia, Ltda., Cale 13, 7-60, Oficina 402, Bogota, is interested in obtaining exclusive agencies for burglar alarms, shoe-repairing machinery, and hardware electrical equipment.

Hong-Kong. The China Trading Corporation, York Buildings, 4th Floor, P.O. Box 716, Hong-Kong, wish to establish connections on an agency basis with U.K. manufacturers or exporters of electrical equipment.

Israel. Palestine Aluminium and Other Metal Products Factory, Ltd. (Palalum), P.O. Box 410, Tel Aviv, is interested in machinery, equipment and raw materials for the production of all kinds of aluminium and enamel domestic utensils, domestic and commercial electrical equipment and sanitary equipment.

Panama. Manelon, Calle Darien No. 8 (P.O. Box 3217), Panama, seeks agencies for all types of electrical appliances and writing devices.

Peru. Senores Neisser and Co., S.A. of Jiron Callao 141-145, Lima, are interested in obtaining the representation in Peru of U.K. firms manufacturing diesel engines, water and steam turbines, boilers, light and heavy railway equipment (locomotives and cars) and road building equipment.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Allan, Hughes, Ltd. Retailers, distributors, factors, manufacturers and wholesalers of and dealers in wireless, radio, television, etc. Cap.: £2,000. Dirs.: H. J. Barker, 46 Castletown Rd., W.14., A. H. Redmayne.

Colon Electromotives, Ltd., 6 Coleherne Mews, S.W.10. Manufacturers of and dealers in dynamos, motors, etc. Cap.: £100. Dirs.: N. Gardner and Lilian M. Gardner.

George Douglass and Co., 124 Heaton Rd., Heaton, Newcastle-on-Tyne, 6. Designers and manufacturers of and dealers in inter-tele communication, telephone, telegraph, television and radio apparatus, etc. Cap.: £2,000. Dirs.: G. W. A. Douglass, N. C. Usher, W. Odell.

John Payne and Co., Ltd., 117 Monnow St., Monmouth. To take over business of electrical, mechanical and refrigerating engineers carried on at Monmouth by John Payne and Co. Cap.: £10,000. Dirs.: J. W. Payne, W. J. Spence-Thomas.

Neon Monograms, Ltd., 69 Ship St., Brighton. Manufacturers of and dealers in electrical and neon signs, etc. Cap.: £100. Dir.: F. H. Wingrave.

Welbeck Electrical Co., Ltd., 32 Strand, W.C.2. Cap.: £100. Dirs.: J. M. Milne and Mrs. M. H. Milne.

Q. R. T. I., Ltd., 3 Lammas Rd., Richmond, Surrey. To take over business of Q. R. Television Installations, carried on at 118 Sheen Rd., Richmond, Surrey, and at 3 Lammas Rd., Richmond, by A. E. Powell. Cap.: £1,000. Dirs.: A. E. Powell and Mrs. M. Powell.

Thorpes of Gosforth, Ltd., 14 Grey St., Newcastle-on-Tyne 1. General electrical engineers, electrical installation contractors, etc. Cap.: £3,000. Dirs.: E. Thorpe, Mrs. M. Thorpe and E. Thorpe, Junr.

Thornhill and Willsmere, Ltd., 54 Emlyn St., Newport, Mon. Refrigeration, mechanical, electrical and radio engineers, etc. Cap.: £2,000. Dirs.: V. R. Thornhill and R. A. Willsmere.

Timeco (Northern), Ltd. Whitfield St., Leeds, 10. Manufacturers of and dealers in time recorders, spring and electric clocks, etc. Cap.: £2,000. Dirs.: J. L. Collumbine and Mrs. H. Collumbine.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Flurolite. 687,263. Class 9. Photographic apparatus. Kodak Ltd., Kodak House, Kingsway, London W.C.2.

Geni. 684,027. Class 11. Electric lamps. Lustro Distributors, Ltd., 25 Millbank, London S.W.1.

Spinney. 685,107. Class 9. Scientific and teaching apparatus and instruments. Littlewoods Mail Order Stores, Ltd., Waterloo Buildings, Cases St., Liverpool 1.

Synovar. 686,429. Class 17. Insulating materials and insulating varnishes. Pinchin, Johnson and Associates, Ltd., 4 Carlton Gardens, London S.W.1.

ASSOCIATED ELECTRICAL INDUSTRIES

THE fiftieth annual general meeting of Associated Electrical Industries, Ltd., was held on May 31, in London.

The Rt. Hon. Oliver Lyttelton, D.S.O., M.C., M.P., the chairman, in the course of his speech, said the volume of production in 1949 was approximately 11% higher than in 1948.

We believe that confidence between the directorate, the management and staff, and all those employed, rests upon a solid foundation. If any proof of this were needed, it would perhaps be shown by the fact that we have over 3,400 men and women who have more than 30 years' service in the companies of the group. Industrial relations have remained unclouded by any serious difficulties throughout the year.

On your behalf once more I pay a sincere tribute to the work of the staff and all in the group.

It is desirable that stockholders should realise how limitation of dividends affects them, at a time of high taxation and increased earnings. During the three years 1947-49, the company has provided for income tax and profits tax £8,252,000 and has paid out in wages and salaries £52,000,000, whilst the ordinary stockholders have received dividends of £2,700,000 before the deduction of taxes, or £1,485,000 net. The figure of £52,000,000 for wages means that we have been able to increase the earnings of those employed by an average of nearly 17%, and we have been glad to do it. The additional cost to the company has been £5,000,000. Thus the amount paid in tax has been more than three times, and the increases in earnings by our employees have been almost twice, the total gross amount received by the stockholders.

In spite of the expanding turnover and increased invoicing, stocks and work in progress, taking into account progress payments, have shown a reduction of £3,020,000 during the year. In times when scarcity of materials and irregularity of deliveries increase the difficulties of phasing industrial production, this achievement is notable. It has only been brought about by the concentrated attention of the executive directors and all concerned to the mass of detail involved.

The total volume of orders upon the books of the company at one time during the year exceeded £100,000,000.

I should particularly draw your attention to the striking increase in the orders received for electronic equipment of all kinds, which have exceeded the amounts booked in 1948 by no less than £6½ million, excluding cathode ray tubes and valves.

Some Technical Achievements

At Trafford Park Metropolitan-Vickers have installed a 2,000 kW gas turbine to assist the winter load. It is designed to run on medium grade oil fuel, and is providing invaluable experience.

A synchrotron for Glasgow University and a cyclotron for Liverpool University are being built in connection with atomic energy research. An experimental gas turbine locomotive on order for British Railways is well advanced and should be running this year.

The B.T.H. Co. have developed a circuit employing ignitrons which will switch 30,000 kVA five times per second. It will be used to excite the synchrotron for Glasgow University.

The report was adopted.

The design of HENLEY Straight Through Joints is the outcome of long and specialised experience, and provides a high factor of safety combined with comparatively small dimensions. Components are standardised and interchangeable. Jointing is simple and straightforward.

HENLEY

STRAIGHT THROUGH JOINTS

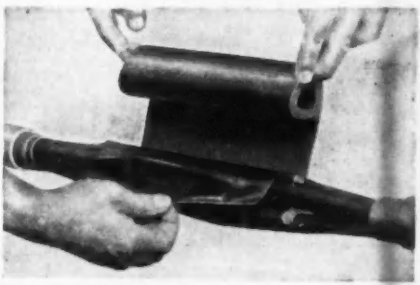
3,300—11,000 Volts

Joints for higher voltages also available. Ask for Catalogue 31/1.

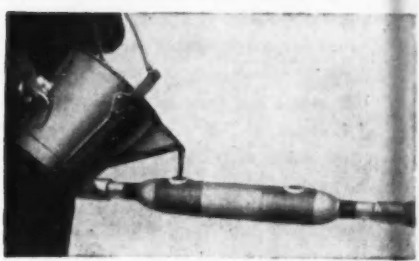
B. E. P. CONVENTION VISIT STAND No. 7

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.
51 - 53 HATTON GARDEN, LONDON, E.C. 1.

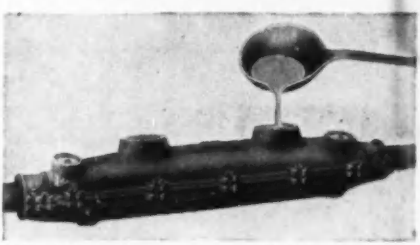
Fitting Henley Grip-type Jointing Sleeves to Conductors.



Wrapping Impregnated Paper Binder over Joint with Paper Separator in position.



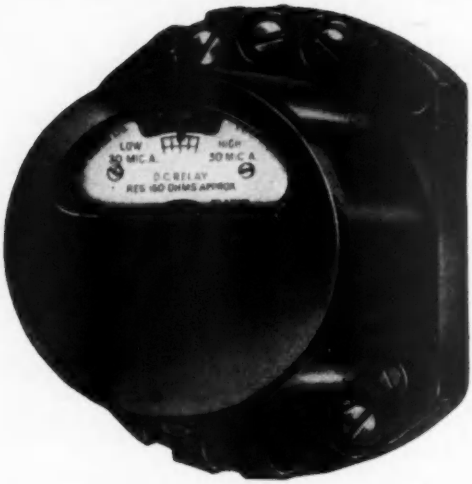
Filling Lead sleeve assembly with Henley Compound (List No. 57016).



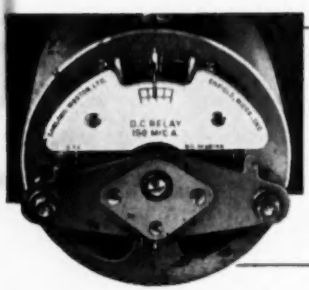
Flooding cover plates of finished joint with Henley Compound (List No. 57005).

FEATURES OF WESTON SUPERIORITY

Weston
MOVING COIL RELAYS



This modern range of relays is ideal for all Laboratory or Industrial Purposes. Built on the permanent-magnet moving coil principle, unaffected by external magnetic fields, the precious metal contacts will not oxidise or tarnish, and the high torque developed ensures positive contact pressure. Supplied in Bakelite casing. Most applications call for special requirements and enquiries should therefore enclose a diagram of the circuit to be closed and state (a) High and/or low contact adjustment; (b) mounting position; (c) resistance; (d) values of current and voltage in local circuit and whether DC or AC; (e) values of resistance and any inductance or capacitance in local circuit; and (f) any special accuracy required. Every 'Weston' relay is specially designed to give the best possible performance for its individual purpose. (The Model illustrated is S54.)



ACCURACY OF ADJUSTMENT. Special note should be made of the reduction gearing which enables the *user* to make accurate adjustment with absolute ease. The accuracy and rigidity of the mounting ensures constant centring after adjustment. Yet another special 'Weston' feature.

SANGAMO WESTON LIMITED

ENFIELD, MIDDLESEX: Telephone: Enfield 3434 (6 lines) & 1242 (4 lines) Telegrams: Sanwest, Enfield.
DEPOTS AT GLASGOW, NEWCASTLE-ON-TYNE, MANCHESTER AND WOLVERHAMPTON.

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

BOROUGH OF SLOUGH

PRIVATE STREET WORKS ACT, 1892

STREET LIGHTING

TENDERS are invited for the whole or any section of the following works in connection with the provision of lighting, under the above Act, in streets on the Lascelles Estate:—

(a) Provision of 50 precast concrete columns.
(b) Provision of 35 lanterns, together with 80-watt mercury vapour lighting equipment.
(c) Erection of 35 columns and installation of lighting equipment.

General conditions of contract and terms may be seen, and specification and bills of quantities may be obtained from the Borough Engineer, Town Hall, Slough, Bucks, on payment of a deposit of £1 1s., which will be refunded on receipt of a bona fide tender.

Tenders, in plain sealed envelopes, endorsed "Street Lighting—Lascelles Estate," must be delivered to the undersigned not later than noon on Monday, June 19, 1950.

The Council do not bind themselves to accept the lowest or any tender.

NORMAN T. BERRY,
Town Clerk.

Town Hall, Slough.
May 31, 1950. (F 43)

NEWCASTLE UPON TYNE EDUCATION COMMITTEE

HILTON PRIMARY SCHOOL

TENDERS are invited from electrical contractors for the electric lighting, power and floor heating installation valued at more than £10,000. Firms wishing to tender should apply for particulars before noon on Tuesday, June 13, 1950, enclosing (1) a cheque for £5 5s. *made payable to "The Newcastle upon Tyne Education Committee,"* which will be refunded on receipt of a bona fide tender, and (2) evidence that an electrical contract of similar magnitude has been satisfactorily carried out during the past five years. Last date for receipt of tenders—July 3, 1950. The Education Committee do not bind themselves to accept the lowest or any tender.

GEORGE KENYON,
City Architect.

City Architect's Department,
Education Section,
18 Cloth Market,
Newcastle upon Tyne 1. (F 35)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

North Western Division

THE British Electricity Authority (North Western Division) invite applications for the position of STATION SHIFT CONTROL ENGINEER at Bury Generating Station.

The salary will be £488-£502 per annum, in accordance with Class "E," Grade 10 of the Revised National Joint Board Schedule.

Candidates should preferably possess technical qualifications and experience in a generating station is desirable.

Applications, stating age, present position, and giving full details of qualifications, education, and experience, should be received by The Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than June 17, 1950. (F 57)

BOROUGH OF DOUGLAS, ISLE OF MAN

Electricity Undertaking

APPLICATIONS are invited for the following appointments in the Corporation generating station:—

POWER STATION SUPERINTENDENT

Applicants should have a sound technical education and practical experience in the operation and maintenance of a modern steam-generating station. Preference will be given to Corporate Members of the Institution of Mechanical Engineers with experience in the supervision of power station staff. Experience with modern p.f. fired high-pressure boilers is essential.

The salary will be in accordance with Class C, Grade 3 of the Isle of Man Joint Board schedule, at present £710, rising to £724 p.a.

Accommodation can be made available.

SHIFT CHARGE ENGINEER

Applicants should have experience in the operation of a modern steam generating station, and be prepared to undertake maintenance duties. Preference will be given to candidates with experience in modern p.f. fired boilers and possessing technical qualifications up to National Certificate standard.

The salary will be in accordance with Class C, Grade 8 of the Isle of Man Joint Board schedule, at present £494, rising to £514.

The Corporation operates a steam power station of 10 MW capacity. An extension is under construction, consisting of one 5 MW turbo-generator, and two p.f. fired boilers, but the effective capacity of the station would remain at 10 MW.

The appointments will be established posts under the superannuation scheme of the Corporation, and the successful candidate will be required to contribute to the Council's superannuation fund and pass a medical examination.

Particulars of superannuation scheme, income tax and living conditions in the Isle of Man may be obtained upon application to the Town Clerk, Town Hall, Douglas, Isle of Man.

Applications endorsed "Power Station Superintendent" and "Shift Charge Engineer" respectively, giving particulars of age, qualifications experience and earliest date available, together with three recent testimonials, should be addressed to the Borough Electrical Engineer and Manager, Electricity Offices, Ridgeway Street, Douglas, Isle of Man, not later than June 26, 1950.

PERCY M. SHIMMIN,
Town Clerk.

Town Hall,
Douglas, Isle of Man.
May 24, 1950. (F 16)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:

ASSISTANT ENGINEER (Mechanical), Little Barford Generating Station.

Candidates should possess Higher National Certificate in Electrical or Mechanical Engineering and should have a sound engineering training and be thoroughly conversant with repairs and maintenance of a large generating station.

The salary offered will be in accordance with the N.J.B. Schedule, Grade 10, Class G £539/£561 per annum) but may be subject to negotiation through the N.J.B.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than June 23, 1950. Envelopes should be endorsed "Assistant Engineer (Mechanical), Little Barford."

W. N. C. CLINCH,
Controller.

Northmet House, Southgate, N.14. (E 77)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the appointment of COMBUSTION ENGINEER at Divisional Headquarters at a salary in accordance with Class "AX/CX," Grade 3 (£737-£921) of the Revised National Joint Board Schedule.

Applicants should have obtained the Higher National Certificate or equivalent, and had extensive experience in the operation and efficiency control of high-pressure steam plant.

The appointment is superannuable under the British Electricity Authority and Area Board's Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed applications should be returned not later than June 21, 1950, in a sealed envelope endorsed "Combustion Engineer"

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
June 1, 1950. (F 61)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of COMMUNICATION ENGINEER in the Divisional Technical Engineer's Department. The position is graded as Second Assistant Engineer, and the salary range will be in accordance with Schedule C of the National Joint Board Agreement, Grade 2, £752 to £966 per annum.

Applicants must be corporate members of the Institution of Electrical Engineers or possess equivalent qualifications, and should have wide experience in the design, manufacture, commissioning and maintenance of various types of supervisory apparatus and communication equipment as applied to power undertakings. Experience must not be restricted to telephone exchange practice, and preferably should not be confined to one particular manufacturer's products.

Conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Divisional Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and must be returned not later than June 24, 1950.

F. W. LAWTON,
Divisional Controller.
(F 83)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

SHIFT CHARGE ENGINEER

APPLICATIONS are invited for the position of Shift Charge Engineer at the Blackburn Meadows Power Station, Sheffield.

Applicants should have had a good general education and be technically trained to Higher National Certificate standard, and be thoroughly experienced in the operation of modern high pressure plant.

Conditions of service and salary will be in accordance with the N.J.B. Schedule, Class "H," Grade 7, £692/£722 per annum.

The appointment will be subject to the provisions of the authority's superannuation scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms must be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed Shift Charge Engineer.

G. A. VOWLES,
Divisional Controller.
(F 80)

SOUTH EASTERN ELECTRICITY BOARD

Tunbridge Wells District

DISTRICT SENIOR CLERK

SALARY of £570 by £20 to £630 per annum under the N.J.C. Agreement, Grade 5. Superannuation will be arranged. Under a scheme for the future organization of the East Sussex and South West Kent Sub Area, the existing Tunbridge Wells District will be enlarged by the inclusion of the present Tonbridge and East Grinstead Districts and part of the Weald District and the number of consumers will increase from approximately 17,000 to over 31,000. Applicants should have good organizing and administrative ability and a secretarial or accountancy qualification would be an added advantage.

Applications, giving two references, must reach T. W. Dann, Esq., M.Eng., M.I.E.E., District Manager, South Eastern Electricity Board, Town Hall, Tunbridge Wells, Kent, by June 19, 1950.

A. L. BURNELL,
Secretary.
June, 1950. (F 81)

HIS MAJESTY'S COLONIAL SERVICE

A VACANCY exists for an ASSISTANT ELECTRICAL ENGINEER, Electricity Department, Public Works Department, Colony of Aden. The appointment is permanent and pensionable in the salary scale £650 to £1,250, point of entry depending on age, qualifications, experience, and war service.

Candidates should be under 40 years of age and should have served a full apprenticeship in electrical engineering and have had previous experience in a power station with water-tube boilers and turbines. Preference will be given to a candidate who is a corporate member of the Institution of Electrical Engineers.

The terms of service include free first-class passages once each way each tour for the officer, his wife (if married), and up to four children below the age of 18 years; partly furnished quarters at low rentals are provided; home leave on full pay at the end of each tour of 18 to 24 months at the rate of seven days for each month of residential service; income tax at low local rates; free medical attention for the officer.

Intending candidates should write for further particulars and application form to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, London S.W.1, giving brief details of age, qualifications, and experience as soon as possible, quoting the reference No. 27326/31. (F 53)

FOREIGN OFFICE ADMINISTRATION OF AFRICAN TERRITORIES

APPLICATIONS are invited for a vacancy in the Public Works Department under the British Administration of Tripolitania for a POWER STATION SUPERINTENDENT. Candidates should hold an engineering degree or have Corporate membership of Institute of Mechanical Engineers or Institute of Electrical Engineers.

Salary £900 by £30 to £1,050 per annum. This does not normally attract liability to British Income Tax (Schedule E) but is subject to a local tax of approximately 8 per cent. In addition a tax free Foreign Service allowance ranging from £130-£530 per annum according to circumstances of the candidate, is payable.

Appointment is temporary and offered subject to medical examination. The contract is for two years, but is subject to three months' notice on either side.

Responsible for generation, transmission and distribution of electricity from a central 11,000 kW steam turbine/diesel powered station and several smaller out-stations. Sole responsibility to Controller of Public Works for the technical and commercial administration of generation including fixation of tariffs. Knowledge of h.t. transmission and distribution necessary.

Write for application form from Ministry of Labour and National Service, Technical and Scientific Register (K), York House, Kingsway, London W.C.2, quoting reference D.156/50-0-A. Closing date June 24, 1950. (F 64)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of SHIFT CHARGE ENGINEER at:

(1) Wallasey Power Station, Cheshire.

The commencing salary will be in accordance with Class D, Grade 7, of the National Joint Board Schedule, i.e. £563–£573 per annum.

(2) Lister Drive Power Station, Liverpool.

The commencing salary will be in accordance with Class F, Grade 7, of the National Joint Board Schedule, i.e. £625–£643 per annum.

Applicants should have had a good general education and experience in the shift operation of generating plant. The possession of a Higher National Certificate or equivalent qualification would be an advantage.

The appointment will be superannuable under the British Electricity Authority and Area Board's Superannuation Scheme, and is subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Merseyside and North Wales Division, Clarke Gardens, Woolton, Liverpool, and should be returned to him not later than Wednesday, June 14, 1950.

A. R. COOPER,
Divisional Controller.
(F 37)

BRITISH ENGINE, BOILER & ELECTRICAL INSURANCE CO. LTD.

98 West George Street, Glasgow

THE Company has a vacancy for an ELECTRICAL PLANT INSPECTOR in Glasgow. Permanent position carrying progressive salary scale £450 to £650 and non-contributory pension. Candidate, age 26 to 33 years, with apprenticeship in the manufacture of electrical machinery and preferably with subsequent experience of repairs and industrial use of electrical machinery and who has gained the Higher National Certificate in Electrical Engineering or is Grad. I.E.E., is invited to apply in own handwriting, stating age, qualifications and experience. (F 76)

NORTH WESTERN ELECTRICITY BOARD

No. 5 Sub-Area

SUB-AREA CONSUMERS' ENGINEER'S DEPARTMENT

APPLICATIONS are invited for the following appointments in the Consumers' Engineer's Department, No. 5 Sub-Area Headquarters, Blackburn:—

1. SECTION HEAD—POWER SALES

Candidates should be technically trained and preferably have experience in the development and utilisation of electricity in industry, with particular reference to textile, colliery, and engineering trades.

Administrative ability, together with experience of changeover from d.c. to a.c., the development of street lighting systems, and a knowledge of the economics of private generating plant are essential qualifications.

Corporate membership of the Institution of Electrical Engineers would be an advantage.

The salary will be in accordance with the National Joint Board, Schedule Class "H," Grade 4, i.e., £878-£898-£918 per annum.

2. ASSISTANT TO SECTION HEAD—POWER SALES

Candidates should be technically trained and preferably have experience in power sales work, with particular reference to electrification of the textile and engineering industries.

Experience of changeover from d.c. to a.c., and of industrial uses and street lighting, are desirable advantages. Technical training up to Higher National Certificate standard will be an advantage.

The salary will be in accordance with the National Joint Board Schedule, Class "H," Grade 10, i.e., £571-£584-£597 per annum.

3. ASSISTANT POWER SALES ENGINEER

Candidates should have practical training and general electrical engineering experience in the utilisation of electricity in industry.

Experience in changeover from d.c. to a.c. and street lighting is desirable but not essential.

The salary will be in accordance with the National Joint Board Schedule, Class "H," Grade 13, i.e., £458-£467-£476 per annum.

4. SUB-AREA DEMONSTRATOR

Candidates must have had a good education, with training in domestic science, and should hold the E.A.W. Diploma. The person appointed will be required to give lectures and demonstrations on all types of domestic appliances, advise consumers on the choice of equipment, and must be capable of handling staff and arranging the training and electrical education of new entrants up to E.A.W. Diploma standard.

The salary will be in accordance with Grade 2 of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry, i.e., £390 by £20 to £450 per annum.

5. ASSISTANTS TO SECTION HEAD—COMMERCIAL DEVELOPMENT

Applicants should have experience in each of the following: Supervision of showrooms; domestic and commercial load development; organisation of exhibitions and demonstrations; publicity, advertising, and display; agricultural and horticultural applications.

The salary will be in accordance with the National Joint Board Schedule, Class "H," Grade 13, i.e., £458-£467-£476 per annum.

6. ASSISTANT TO INSTALLATION ENGINEER

Applicants should have experience in the supervision of the installation of wiring, switchgear, motors, plant, and lighting in industrial and commercial premises and public buildings. Experience in the preparation of specifications and estimates would be an advantage.

The salary will be in accordance with the National Joint Board Schedule, Class "H," Grade 13, i.e., £458-£467-£476 per annum.

Applications, stating age, training, qualifications, and experience, present position and salary, and the appointment for which application is made, should be received by R. H. Harral, Esq., M.I.E.E., M.Inst.F., No. 5 Sub-Area Manager, The North Western Electricity Board, Jubilee Street, Blackburn, not later than Saturday, June 17, 1950.

(F 56)

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the position of SECOND ASSISTANT DISTRICT ENGINEER, Exe Valley District, Taunton Sub-Area, with headquarters at Tiverton.

The commencing salary will be in accordance with Class "B," Grade 7 of the N.J.B. Schedule, commencing at £492 per annum; this is subject to confirmation.

Applicants should have had extensive experience of HV/LV O/H and U/G distribution systems in an urban/rural area, and be capable of assisting in plans for future development. The person appointed will have responsibility for matters connected with construction, operation, and maintenance of distribution networks, sub-station plant, and ancillary apparatus; he will be required to undertake standby duty.

Applications, stating age, qualifications, experience and present salary, to be submitted to District Manager, South Western Electricity Board, 12 Angel Hill, Tiverton, within 10 days.

E. M. HUGHES,
Assistant Secretary (Establishments).

Electricity House,
Colston Avenue, Bristol 1. (F 79)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

DRAUGHTSMEN

APPLICATIONS are invited for positions as Draughtsmen at the Divisional Headquarters, Barker Gate, Nottingham, from persons with experience in one or more of the following branches of work in connection with the construction of generating stations.

(a) ELECTRICAL ENGINEERING. General design, assembly and layouts of h.t. and auxiliary switchgear, transformers, cables, o.h. lines and heavy plant.

(b) MECHANICAL ENGINEERING. General design, assembly and layouts of modern boiler and fuel handling plant, turbo alternators and condensing plant. Circulating water, steam and feed piping, foundations, etc.

(c) CIVIL ENGINEERING. General design of steel and reinforced concrete structures, foundations retaining walls, tunnels, etc.

(d) ARCHITECTURAL ASSISTANTS. Applications are invited from men (preferably qualified) with experience in design of architectural work for modern power stations, office and welfare buildings.

The salary will provisionally be within the range £450-£550 per annum.

The salary range quoted is to be regarded as provisional until final scales have been negotiated with appropriate organisations, and superannuation will be under terms approved by the British Electricity Authority.

Applications must be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, and should be returned not later than the 26th June, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. (F 82)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT SECTION ENGINEER
COVENTRY SECTION OFFICE

APPLICATIONS are invited for the position of Assistant Section Engineer in the Coventry section of the transmission department.

Commencing salary will be within the salary range £516-£647 per annum in Class AX, Grade 6, Schedule C, and thereafter according to divisional classification, at present DX.

Candidates must have had experience in the maintenance and operation of high voltage overhead lines, outdoor transforming and switching stations. Experience of 132 kV equipment would be an advantage.

Corporate or graduate membership of I.E.E. or equivalent qualifications will be required.

The appointment will be subject to the successful applicant entering the British Electricity Authority's superannuation scheme.

Applications should be submitted on the official form of application which may be obtained from the Divisional Establishments Officer, at the undermentioned address, and be returned not later than June 12, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham,
May 24, 1950. (F 18)

SOUTHERN ELECTRICITY BOARD

No. 1 (Southall) Sub-Area

APPLICATIONS are invited for the post of SENIOR ASSISTANT in the Sub-Area Secretary's Department, Windmill Lane, Southall, Middlesex.

Candidates must have knowledge and experience of insurance, including the settlement of claims, also general secretarial and administrative experience.

Knowledge of the Electricity Supply Acts and other relevant legislation will be a necessary qualification.

The salary will be in accordance with Grade 4 of the Agreement negotiated by the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry and will commence at a point dependent upon qualifications and experience, within the range of £510-£570 per annum.

The successful applicant, if not already a member of a Superannuation Scheme in respect of his present service in the supply industry, will be required to join the B.E.A. and Area Boards' Superannuation Scheme if and when eligible.

Applications should be made on the standard form obtainable from the Sub-Area Secretary, Southern Electricity Board, 2-6 Windmill Lane, Southall, Middlesex, and returned to him not later than fourteen days after the appearance of this notice.

F. W. KEMPTON,
Secretary.
(F 58)

SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY AUSTRALIA

PERMANENT TECHNICAL APPOINTMENTS

APPLICATIONS are invited for the following senior engineering positions for work associated with the construction of a large hydro-electric project. Work includes hydrological investigations; investigation, design, and construction of dams, large tunnels, race lines and allied engineering works; establishment and operation of engineering laboratories and engineering scientific services; structural engineering; supervision of workshops for plant maintenance; general overall power planning and electrical system design; design and installation of power stations, transmission lines, including appurtenant electrical and mechanical equipment.

CHIEF ELECTRICAL ENGINEER. (S.M.R.T. 103/1) Salary, £1,855 to £2,042 (Aust.).

CHIEF MECHANICAL ENGINEER. (S.M.R.T. 103/2). Salary, £1,855 to £2,042 (Aust.).

EXECUTIVE ENGINEERS, GRADE 3 (S.M.R.T. 103/3). Salary, £1,542 to £1,855 (Aust.).

EXECUTIVE ENGINEERS, GRADE 2. (S.M.R.T. 103/4). Salary, £1,230 to £1,480 (Aust.).

EXECUTIVE ENGINEERS, GRADE 1. (S.M.R.T. 103/5). Salary, £1,050 to £1,230 (Aust.).

Vacancies exist for Executive Engineers in civil engineering, electrical engineering, and mechanical engineering.

Applicants should be graduates in engineering of recognised university, corporate members of the Institution of Engineers, Australia, of the Institution of Civil, Mechanical, or Electrical Engineers (London), or hold examination qualifications that would exempt them from the Associate membership examination of the Institution of Engineers, Australia, or any of the above institutions.

QUALIFICATIONS:

CHIEF ELECTRICAL ENGINEER

Applicants should have sound knowledge of the economics of electricity supply and should be experienced in the design and layout, purchase, and operation of plant associated with the generation and long-distance transmission of large blocks of power, and should be capable of directing and controlling a large technical staff.

CHIEF MECHANICAL ENGINEER

Applicants should be experienced in the design, layout, and purchase of plant associated with large hydraulic turbine units, and should have knowledge of the layout and operation of workshops for assembling and maintaining power plant, modern earth-moving equipment and heavy transport vehicles, and should be capable of directing and controlling a large technical staff.

EXECUTIVE ENGINEERS, GRADE 3

Applicants should have comprehensive knowledge of engineering techniques and criteria pertaining to the assigned area of specialisation involved, marked ability to review and evaluate work performed by subordinate officers, ability to initiate and interpret procedures and to improve existing engineering methods, and ability to plan and direct an engineering programme of work.

EXECUTIVE ENGINEERS, GRADE 2

Applicants should have specialised and extensive knowledge of the method, techniques pertaining to the particular phase of the Authority's engineering work to which the officer is assigned; ability to advise on technical problems; ability to visualise the comprehensive development of the particular job assigned in relation to the overall needs of the Authority and also should have thorough knowledge of administrative practices and procedures.

EXECUTIVE ENGINEERS, GRADE 1

Applicants should have a detailed knowledge of established methods and techniques followed in the engineering field assigned to officers of this grade; ability to review and evaluate engineering work carried out by subordinate officers; leadership and ability to plan, supervise, coordinate and review the work of such engineers and other officers and to explain the technical and administrative practices, methods, and procedures.

Applications are also invited for

ENGINEERS (S.M.R.T. 104)
(Electrical and Mechanical Engineers)

Grade 4, £980-£1,050 per annum (Australian currency).
Grade 3, £810-£877 per annum (Australian currency).
Grade 2, £742-£787 per annum (Australian currency).
Grade 1, £607-£742 per annum (Australian currency).

Applicants must be graduates in engineering of a recognised university, corporate members of the Institution of Engineers, Australia, or the Institution of Mechanical Engineers or the Institution of Electrical Engineers, or hold examination qualifications that would exempt them from the associate membership examination of any of those institutions.

All salaries are subject to variation by cost-of-living adjustments. The commencing salary within any particular grade will be in accordance with qualifications and experience.

(Continued in next column)

(Continued from previous column)

The Authority will meet the cost of first-class boat fares to Australia for the appointees and dependants. Salary (Australian) will be paid from the date of reporting for duty in Sydney, New South Wales, and accommodation on arrival is guaranteed. If permanent accommodation is not immediately available, the Authority will pay an allowance where a married officer and family are temporarily quartered in hotel or guest house.

Applicants must be British subjects and may become contributors under the Commonwealth Government Superannuation Scheme. Liberal privileges, including three weeks' annual leave, long-service leave, sick leave, etc., are provided.

Information concerning the Snowy Mountains Hydro-Electric Development, and particulars of qualifications-duties, and conditions of employment may be obtained from the representative of the Authority in Great Britain.

The headquarters of the Authority are at present located in Sydney, but will later be at Cooma, near the Snowy Mountains area in the south-eastern portion of New South Wales.

Applications (in writing only), stating education qualifications, and experience in chronological order, age nationality, present position and salary, should be addressed to The Representative in Great Britain of the Snowy Mountains Hydro-Electric Authority, c/o New South Wales Government Offices, 56 Strand, London W.C.2, endorsed with the appropriate reference number quoted in brackets above. Original testimonials should not be included. Communication will only be made with applicants selected for further consideration. (F 60)

NORTH WESTERN ELECTRICITY BOARD

No. 1 Sub-Area

APPOINTMENT OF (a) METER TESTERS; (b) INSTALLATION INSPECTORS

VACANCIES exist for
(a) Meter Testers in the testing stations at the Polygon, Tower Street, Ardwick, and Frederick Road, Salford.
(b) Installation Inspectors at the South District, High Street, Cheadle.

The wages and working conditions for both vacancies will be in accordance with the Agreement of the National Joint Industrial Council for the Electricity Supply Industry, the present rate of pay for a 44-hour, 5-day week being: (a) 35.00d. per hour; (b) 37.25d. per hour.

Applicants for (a) should have had experience in the testing and calibration of single and polyphase a.c. meters. Applicants for (b) should have had experience of electrical installation work and the testing of domestic, commercial and industrial electrical installations.

Technical qualifications up to Ordinary National standard will be an advantage.

Applications, stating age, training, and experience, present position and wage, should be received by Sub-Area Secretary, The North Western Electricity Board, Town Hall, Manchester 2, P.O. Box 493, not later than June 17, 1950.

May 27, 1950. (F 52)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following positions at West Ham Generating Station.

DEPUTY STATION SUPERINTENDENT

Applicants should have received a thorough technical and practical training and have had a sound operation and maintenance experience in a medium or large capacity power station.

The successful applicant will be responsible to the Station Superintendent for the efficient operation and maintenance of the station and in his absence will be required to assume full responsibility.

Salary and conditions in accordance with the revised N.J.B. Schedule, Class "G," Grade 3, plus London allowance, £929 5s. per annum.

TURBINE HOUSE SUPERINTENDENT

Applicants should have had sound technical training and practical experience in the efficient operation of a medium or large capacity power station.

Character and ability to deal with staff problems are important.

Salary and conditions in accordance with the revised N.J.B. Schedule, Class "G," Grade 6, plus London allowance, £742 7s. per annum.

Applications, stating age, experience and present salary, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, and be received within fourteen days after the publication of this advertisement.

J. N. WAITE,
Divisional Controller.
(F 73)

BRITISH ELECTRICITY AUTHORITY

APPLICATIONS are invited for the appointment of ASSISTANT to the Fuel Technologist in the Generation Operation Branch of the Chief Engineer's Department at Headquarters in London.

Applicants should have a Fuel, Engineering or Chemical Engineering Degree or equivalent qualifications and a knowledge of the properties of British coals and their combustion, particularly in relation to suitability for use in power stations. Experience of the operation of large boilers and of the effect of fuel quality and cost on the economics of power station operation is essential.

The starting salary will be determined according to the qualifications and experience of the selected applicant with Grade 3, Schedule C of the N.J.B. Agreement, £755 to £1,017 per annum, rising ultimately to £1,120 per annum, including London allowance.

The appointment is superannuable and the successful candidate may be required to pass a medical examination.

Application forms may be obtained from D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to him not later than June 23, 1950. The information on the application form may be supplemented on separate sheets if the applicant so desires.

Please quote reference AE/48. (F 78)

SOUTHERN ELECTRICITY BOARD

No. 1 (Southall) Sub-Area

JUNIOR TESTING ASSISTANT

APPLICATIONS are invited for the position of Junior Testing Assistant in the Meter Department at Waterloo Road, Uxbridge, Middlesex.

Applicants should hold technical qualifications equal to Ordinary National Certificate standard and be fully conversant with the testing, repair and calibration of all types of single and three phase meters, prepayment meters and instruments. A sound knowledge of the Electricity Supply (Meters) Act 1936 is essential.

Provisional salary, subject to negotiation with the appropriate body, will be £400 per annum with National Joint Board conditions. The successful applicant will be required to join the B.E.A. and Area Boards' Superannuation Scheme, if and when eligible.

Forms on which application must be made may be obtained from the Sub-Area Secretary, No. 1 (Southall) Sub-Area, Southern Electricity Board, 2-6 Windmill Lane, Southall, Middlesex, and when completed should be returned to him not later than two weeks after the appearance of this advertisement.

E. C. T. OLDCORN,
Sub-Area Manager.
2-6 Windmill Lane, Southall, Middlesex. (F 85)

ALBRIGHT AND WILSON, LTD., invite applications for a vacancy in their Silicones Department: ELECTRICAL ENGINEER who will be mainly concerned with giving technical service to users of Silicones in the electrical industry and the deopmpnt of new uses of Silicones. The work will be centred in the London office and will involve visits to customers.

Applicants should possess a degree in electrical engineering or its equivalent and be between the ages of 27 and 35.

Applications, which will be treated in strict confidence, should include particulars of education and experience, and should be sent to the Technical Staff Committee, Albright and Wilson, Ltd., 49 Park Lane, London W.1. (F 70)

AN interesting opportunity exists for a young and fully qualified ELECTRICAL ENGINEER with knowledge of electronics in connection with servo mechanism development for aircraft.—Write to Mr. G. Orloff, Chief Designer, British Messier, Ltd., Cheltenham Road East, Gloucester. (F 50)

CHARGE ENGINEERS

POWER STATION CHARGE ENGINEERS urgently required by major oil company for service in the Middle East. Must hold at least Higher National Certificate in Electrical Engineering and have had not less than three years' experience in the operation of large modern steam power stations with thorough knowledge of the routine operation of water-tube boilers, turbo-alternators, E.H.T. switchgear and auxiliary plant. Present position in this country should be not less than Grade 8a, Class "H" or Grade 8, Class "G" on N.J.B. Scale. Age not over 35 years. Married accommodation available. Commencing salary not less than £900 per annum, plus generous allowance in local currency. Free passages out and home; free medical attention, kit allowance, good leave arrangements. Pension scheme.

Write, giving age, personal particulars, and full details of qualifications and experience, quoting Dept. F.189 to

Box 2550, at 191 Gresham House, E.C.2. (E 284p)

AIR MINISTRY have vacancies for DESIGNERS A DRAUGHTSMEN in the Designs Branch of the Works Department for high-class work in the following fields: Mechanical and Electrical Engineering. The work includes design for London Airport. Salaries are on ranges up to £750. Starting pay according to age and qualifications.—Applications, stating age, qualifications, previous appointments and salary required should be sent to Air Ministry, S.2(h), Cornwall House London S.E.1. It is regretted that applications of candidates not called for interview cannot be acknowledged. (F 21)

ANGLO-AMERICAN OIL CO., LTD., requires for its large new refinery now under construction at Fawley, near Southampton, an ELECTRICAL ENGINEER to be responsible for the electrical section of the Engineering Department. The appointment in the first instance will be on the supervision of construction, and subsequently the operation and maintenance of all the electrical engineering plant. Qualifications: Electrical engineering degree or equivalent, with apprenticeship with manufacturer of heavy electrical equipment or with a supply authority. Applicants should have had a wide experience in the operation and maintenance of high-voltage underground distribution systems, associated sub-stations up to 10,000 kVA, and protection systems and also supervision of maintenance work on heavy industrial equipment, including motors up to 1,250 h.p., circuit breakers up to 250 MVA control panels, etc.

The post offered is pensionable, and applicants should not be more than 45 years of age.

Applications should state age, qualifications and experience, together with the salary expected. (F 54)

A NUMBER of vacancies will arise this summer for DRAUGHTSMEN at the Bradford works of the English Electric Co. This is due to further expansion, and stable employment under excellent conditions is offered to suitably experienced men. The new drawing office will be concerned with control gear for rolling mills and mining equipment to be manufactured at Bradford. Applications are invited from switchgear and control gear draughtsmen. Electrical and mechanical draughtsmen who have not had previous experience in this field, but who have had sound electrical or mechanical D.O. experience will also be selected. Junior or intermediate grade draughtsmen who wish to gain experience of this interesting electro-mechanical work are also invited to apply. Write, giving full details, quoting Ref. 138 to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (F 1)

APPLICATIONS are invited from senior and medium DRAUGHTSMEN with good practical training for work in the fields of mechanical and radio engineering at the Research Laboratories of The General Electric Co., Ltd., North Wembley, Middx. Men with Higher National Certificate or equivalent will be preferred. Details of age, experience and qualifications should be sent in writing to the Personnel Officer. (F 59)

CONTRACTS MANAGER required by electric cable manufacturers to take full control of installation contracts department. Must have experience in 33 kV cable laying and power station contracts and be capable of organising and controlling entire department, including estimating, technical correspondence, costing, and outside staff.—Apply in writing, stating age, qualification, experience, and salary required, to Box No. 1351, Electrical Times. (F 13)

ELECTRICAL DRAUGHTSMEN for oil refinery work, experienced in wiring and installation layouts and taking off quantities. Should be capable of laying out small sub-stations and switch-houses. Knowledge of cable layouts and flame-proof conduit work desirable. Five-day week, with paid overtime.—Apply by letter, stating age, experience salary expected, and when free to commence work, to Chief Draughtsman, The Lummus Co., Ltd., 525 Oxford Street, London W.1. (E 644)

JOHNSON & PHILLIPS LTD.

OVERSEAS APPOINTMENT

SWITCHGEAR ENGINEER required to take complete charge of and develop switchgear manufacture in an existing factory in India.

Applicants must be fully conversant with the manufacture and assembly of all classes of switchgear up to 11,000 V and be competent to plan complete switchgear installations and the layout of switchboards.

The appointment is a senior one offering considerable freedom of action and scope for initiative and advancement. Salary will depend on the successful applicant's qualifications and experience, but will be at a generous level. Suitable provisions for retirement are available. Normal home and local leave arrangements.

Applications, which will be treated in strict confidence, should be addressed to the:

Managing Director, Johnson and Phillips Ltd., Victoria Way, Charlton, London S.E.7. (F 69p)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

ASSISTANT ENGINEER wanted for wood pole and steel tower contracts in Northern Ireland. Salary according to experience.—Apply: J. L. Eve Construction Co. Ltd., 17 Hill Side, Ridgway, Wimbledon, S.W.19. (E 685)

COMPETENT ELECTRICIAN-WIREMAN AND MATE for Andover/Basingstoke district. Experienced all types installations. Must be able produce proof of ability, good references character, etc. Able to drive van advantage. Good wages and bonus for men willing to work.—Box No. 1379, Electrical Times. (F 73)

ELECTRICAL DRAUGHTSMEN, seniors and juniors, required for long programme of work on oil refineries and chemical plants. Opportunities for good men. Pension scheme. Five-day week, with overtime as required. Salary commensurate with ability.—Write, stating age, qualification, experience, and starting salary to Chief Engineer, E. B. Badger and Sons (G.B.), Ltd., 40 Parkgate Road, Battersea, London S.W.11. (F 58)

ELECTRICAL ENGINEER required for the laboratory of a large engineering organisation in the West London area. Applicants should be between 24 and 30 years of age and possess a Higher National Certificate (Electrical) or equivalent. Experience of the problems associated with the manufacture of light electrical mechanical products is essential. Preference will be given to those who have served an apprenticeship.—Apply, giving details of age, qualifications, and experience, to Box No. 1371, Electrical Times. (F 47)

ELECTRICAL ENGINEERING STORES ASSISTANT required London wholesale depot. Would train suitable applicant.—Box No. 1377, Electrical Times. (F 66)

ELECTRICAL ENGINEER SURVEYOR required for N.E. coast area based on Newcastle. Progressive position. Applicants should have practical training in winding, installation and maintenance of electrical plant. Theoretical training to Higher National Certificate standard. Age 25-33.—Reply, giving full particulars, to Chief Engineer Cornhill Insurance Co., Ltd., Shalford House, Guildford, Surrey. (F 72)

ELECTRICAL ENGINEERS required for service in Middle East. Applicants should (*a*) possess Ordinary or Higher National Certificate and have had full apprenticeship with heavy electrical equipment manufacturers or with a large colliery or allied fully electrified industry, or (*b*) possess a degree and have had two years' technical apprenticeship with similar firm to above. In each case applicants must have had at least three years subsequent experience on the installation and maintenance of heavy electrical equipment. Maximum age limit 35 years. Attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.191, to Box No. 2593, at 191 Gresham House, E.C.2. (E 415)

ELECTRICAL INSPECTORS required by major oil company operating in Middle East. Applicants should have a wide experience of inspection and testing of motors, switchgear, and the electrical equipment associated with modern large generating stations, substations, and transmission and distribution networks with voltage range of 30 kV to 440 V. Knowledge of flameproof equipment an advantage. Possession of Higher National Certificate essential and qualifications up to A.M.I.E.E. desirable. Age limit 37 years. Attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, pension scheme, good leave arrangements.—Write, stating age and full details of qualifications and experience, quoting Dept. F.182, to Box 2333 at 191 Gresham House, E.C.2. (C 304)

ELEXCEL, LTD., require ADDITIONAL SALES REPRESENTATIVES to operate the following areas: South Western, Yorkshire, East Midlands, and South Wales Electricity Boards.—Applications, giving full particulars of previous experience, etc., in strictest confidence, to Sales Manager, Victor Works, Broadgreen, Liverpool 14. (F 51)

ENGLISH Electric have further vacancies at Stafford and Liverpool for DRAUGHTSMEN to meet greatly increased switchgear programme. Men with electrical or mechanical d.o. experience on any class of electrical switch or control gear are required and every consideration will be given to draughtsmen at present on other classes of work who wish to make a career on this vitally important and interesting work.—Apply, quoting reference, 141, to Central Personnel Services, English Electric Co. Ltd., 24/30 Gillingham Street, London S.W.1. (E 706)

INSIDE SALES ENGINEER required for the preparation of tenders for all types and sizes of Rotating Electrical Plant for the home and export markets.—Applications, stating age, experience and salary expected, to: Manager, Rotating Plant Department, Bruce Peebles and Co. Ltd., Edinburgh 5. (F 44)

INTERESTING and progressive position exists for ELECTRICAL DESIGN DRAUGHTSMAN in rapidly expanding company. Experience on light, relay and electro-magnetic components would be an advantage.—Apply to Mr. G. T. Atkins, Electrical Engineer, British Messier, Ltd., Cheltenham Road East, Gloucester. (F 49)

MANUFACTURING ELECTRICAL ENGINEERS and Brassfounders require young man to take charge of small section producing brass watertight plugs, etc., for marine and industrial use. Must have good general knowledge of business and production methods. Excellent opportunity and permanency for right man.—Apply in writing only, giving full particulars of age, training, experience, and salary required, to Secretary, William McGeoch and Co., Ltd., 46 Coventry Road, Birmingham 10. (F 71)

OVERHEAD LINE ENGINEER. Enfield Cables Ltd. seek experienced Transmission Engineer accustomed design and erection overhead power lines, railway electrification projects, etc. To take charge department handling contracts at home and overseas. Salary according experience age not over 50.—Write, full particulars in confidence: C. J. Armstrong, M.I.E.E., Design, Development, Contracts Department, Enfield Cables Ltd., Victoria House, Southampton Row, London W.C.1. (E 46)

REPRESENTATIVES required for all areas in the U.K. to call on factors by a small firm manufacturing fuseboards, etc., incorporating a new patent fuse. Remuneration by a good commission. Car an advantage. —Box No. 1373, Electrical Times. (F 64)

REPRESENTATIVES required for London area, North of England and Scotland. To have good personality and comprehensive up-to-date knowledge of switchgear, up to 132 kV. State previous experience, qualifications, age, and salary required.—Apply: Personnel Manager, Messrs. Cooke and Ferguson, Ltd., South Street, Openshaw, Manchester 11. (F 38)

REPRESENTATIVE. Old-established manufacturers require well-connected Sales Representative, able to handle additional line of domestic and light industrial switchgear, covering Cheshire, Yorkshire, Lancashire, Northumberland and Durham area.—Full details in the first instance to: Box No. 1349, Electrical Times. (F 7)

SENIOR ELECTRICAL DRAUGHTSMEN are required by an established British firm with American affiliation. Experience of power distribution and lighting installations as applied to the oil refinery and chemical industry essential. Qualifications to H.N.C. standard. Substantial salaries will be paid to suitable applicants.—Write, stating age, qualifications, and experience, Foster Wheeler, Ltd., 3 Ixworth Place, London S.W.3. (E 676)

SALES REPRESENTATIVES required in all areas for marketing an entirely new 5-amp switch of revolutionary design and phenomenal performance. Previous experience and sound established connections essential. Good salary and commission, plus car allowance.—Write, stating age, experience, etc., and area thoroughly covered. Replies treated in strictest confidence.—Managing Director, Box No. 1367, Electrical Times. (F 41)

SENIOR ELECTRICAL ENGINEER, able to direct and control research, development, design, and drawing office of old-established light electrical manufacturers. Excellent prospects for man with first-class experience.—Fullest particulars of career to date and salary required in confidence to Box No. 1369, Electrical Times. (E 48)

TECHNICAL SALES ENGINEER required by large London firm for Herts., Essex, Beds. and East Anglia areas. Must have sound knowledge of instruments for industrial processes.—Apply, with details of age, experience, salary, etc.—Box No. 1375, Electrical Times. (F 65)

TRANSFORMER ESTIMATOR AND TECHNICAL CORRESPONDENT required. Must be capable of dealing with tenders for home and overseas business. Practical experience an advantage.—Applications, stating age, qualifications, experience, and salary required, should be addressed to Employment and Welfare Manager, Johnson and Philips, Ltd., Charlton, London S.E.7. (E 693)

VICKERS ARMSTRONGS, LTD., Weybridge, invite applications for the post of ELECTRONICS ENGINEER, to take part in electronic side of special projects. Write, stating experience and qualifications, to: Employment Manager, Weybridge Works. (F 67)

VICKERS ARMSTRONGS, LTD., Weybridge, invite applications for the post of PROJECT ENGINEER, to work on certain special projects. Qualifications required for this post include experience of control methods and knowledge of electronics and instruments.—Write, stating experience and qualifications, to Employment Manager, Weybridge Works. (F 68)

APPOINTMENTS WANTED

ESTIMATING SUPERVISING ENGINEER (30) seeks situation in London or Home Counties, 25 years in electrical contracting.—Reply: Box No. 1345, Electrical Times. (E 721)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

LISTS AND CATALOGUES, ETC., wanted from material suppliers by Electrical Installations, 2 Station Road, Whitchurch, Hants. (F 74)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write Elton Levy Co., Ltd., St. Ermin's (West Side), Caxton Street, London S.W. Phone: WHitehall 9621/2/3. (A 3)

WANTED.—D.C. and a.c. ball-bearing MOTORS.—Full details to Britannia Manufacturing Co., Ltd., 22/26 Britannia Walk, London N.1. (A 13)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady St., Bethnal Green, E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, large or small quantities of SCRAP METERS. Any type. Collected or f.o.r. Highest prices paid. Prompt net cash.—Box No. 1329, Electrical Times. (E 682)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines). Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE ROTOR AND STATOR WINDING. We specialise in the repair and rewind of all types of electrical machines from fractional h.p. upwards. Special departments for vacuum cleaners, dryers, portable tools, etc. All work fully guaranteed.—Walter Crane, Greencoat Electrical Works, Westgate, Wakefield. Telephone 2172. (A 4)

CASTINGS, Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (D 326)

ZEROS REFRIGERATORS.—Complete range of repair and service now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.— Time Engineers, Refrigeration Specialists, 60 Southend Road, Rainham, Essex. Tel.: Rainham 2358; or Southern Area Agency. Tel.: Springpark 4217. Electrical Spares supplied to the trade. (A 639)

AGENCIES

AGENTS wanted for Yorkshire and Lancs., calling upon Wholesale and Retail houses to carry additional lines. Only agents representing reputable houses need apply. Good commission.—Box 1361, Electrical Times. (F 54)

MANUFACTURERS' AGENTS ASSOCIATION, INC. (E.T.), 8 Bream's Buildings, London W.C.2, supplies free lists of Agents to Manufacturers seeking representation in important industrial centres. Membership available to established agents only. Particulars supplied. (A 7)

FOR SALE

CABLES & WIRE

CABLE NOW CHEAPER

TWIN FLAT TRS. 100 yds		SINGLE V.I.R. per 100 yds	
1/044	40/6	Taped braided comp'n'd	
3/029	54/-	1/044	16/-
7/029	85/6	3/029	29/-
3/029 with earth ...	64/6	7/029	31/-
7/029 with earth ...	103/6		

Fully guaranteed. Cash with order. Add part carriage on small orders. Send for "small quantity" discounts, and low-priced accessories list.

BRITISH DISTRIBUTING CO.

66, HIGH STREET, LONDON N.8. (D 517p)

ENAMELLED COPPER WIRE ON REELS

for immediate delivery. Quantities in all gauges from 10-50 s.w.g., very attractively priced, below manufacturers' prices.

PRODUCTS AND COMMERCE, LTD.

14 Dominion Street, London E.C.2.

Met. 9542/3 and 0530. (F 62p)

ART SILK FLEXIBLES, TWIN TWISTED, 250 V. all sizes. Available from stock, in 10 distinct shades.— Samples and prices, Wandleside Cable Works, Ltd., 106 Garrett Lane, Wandsworth, S.W.18. (E 529)

PAPER INSULATED LEAD COVERED AND ARMOURED POWER CABLE to B.S.S. 480/1942, 660V. New and manufactured by Johnson and Phillips, Ediswan and British Electric, etc. At the following bargain prices:—

0·15	4 core	P.I.L.C. & S.	£375 per drum
0·1	4 core	P.I.L.C. & S.	£295 ,, ,,
0·1	4 core	P.I.L.C.S.W.A. & S.	£325 ,, ,,
0·04	4 core	P.I.L.C.S.W.A. & S.	£205 ,, ,,
0·0225	4 core	P.I.L.C.S.W.A. & S.	£155 ,, ,,

All drums are 500 yards each.

Write for full details to : Messrs. Lipton Products Ltd., Phoenix Works, Lamprell Street, Bow, London E.3. (E 554)

PAPER INSULATED ARMOURED CABLES to BSS 480/1942. Considerable stocks available.—Cable Jointers, Ltd., 49 Avenue Road, W.3. Acorn 4831/2. (E 489)

TOUGH RUBBER CABLE available, all sizes and types; non-standard lengths (25 yd. to 50 yd.). Special prices quoted for regular buyer. Must be a user. Guaranteed strictly to B.S.S. 7.—Box No. 1363, Electrical Times. (F 39)

DOMESTIC APPLIANCES

COMMERCIAL IRONS for all purposes.—Donaldsons Wireless Electric Irons, 31 Sloan Street, Leith. (A 163)

IMMERSION HEATERS. Grubb 2 kW and 3 kW standard voltages, all lengths, 12 in. to 36 in. Also 4 kW (non-taxable), 16 in. to 36 in. Fully guaranteed and immediate delivery. For illustrated brochure, latest lists and trade terms write distributors, John Owner and Co., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

ENGINEERING PLANT & MATERIALS

ALUMINIUM ALLOY. Special offer: 6ft. x 3ft x 24 gauge flat or corrugated sheets, £9 9s. per dozen. Also angles available. All prices, carriage paid. Delivery ex-stock.—Sawyers Manufacturering Co., Ltd., Bures, Suffolk. Tel.: Bures 351/2. (B 335)

LADDERS (wooden and aluminium, all types), Trestles, Steps, Handcarts, etc., from Ramsay and Sons (Forfar) Ltd., Forfar (Tel. 172). (C 603)

GENERATING PLANT

ALTERNATORS from stock, 400/440 V, 3 phase, 50 c/s 4-wire, with exciters and switchboards: 80 kW "Westinghouse" 1,000 r.p.m., 40 kW "E.C.C." 750 r.p.m., 28·1 kVA "Crompton-Parkinson" 1,500 r.p.m., 15 kW "G.E.C." 1,500 r.p.m. For full details, write: Thos. W. Ward, Ltd., Albion Works, Sheffield. Phone 26311 (ex 347). (E 109)

DIESEL ALTERNATORS in stock, 1 and 3 phase, standard voltages, up to 100 kVA; details post free on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Phone 26311 (ex 347). (E 108)

MOTOR GENERATING SETS. Built to customers requirements of new and used plant. Many in stock at Wembley, inspection invited. Please send us your inquiries. We can help you to save time. Over a THOUSAND MACHINES ALWAYS IN STOCK.—Dynamo and Motor Repairs Ltd., Wembley Park, Middlesex. Telephone: Wembley 3121 (4 lines). Also at Phoenix Works, Belgrave Terrace, Soho Road, Birmingham. Telephone Northern 0895. (A 2)

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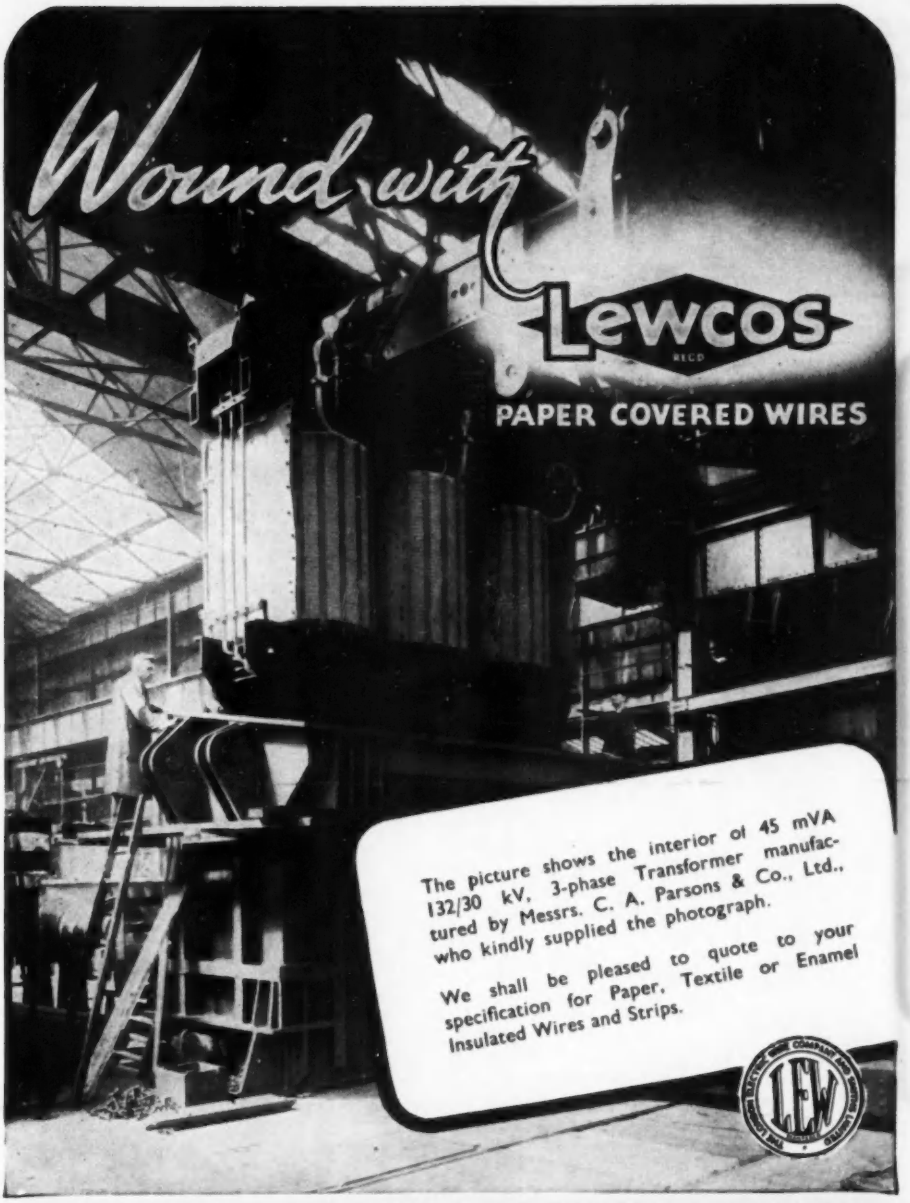
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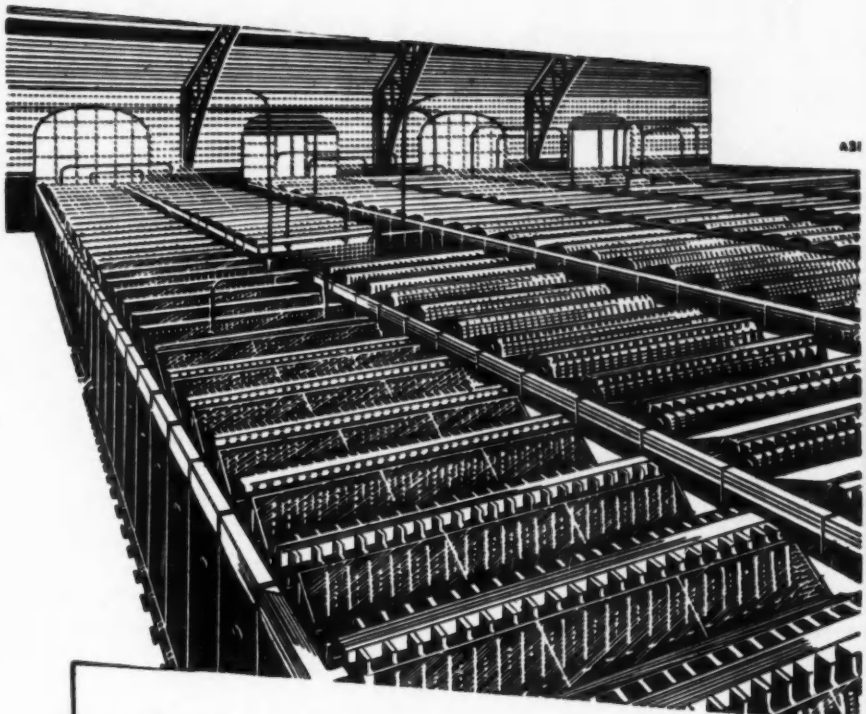

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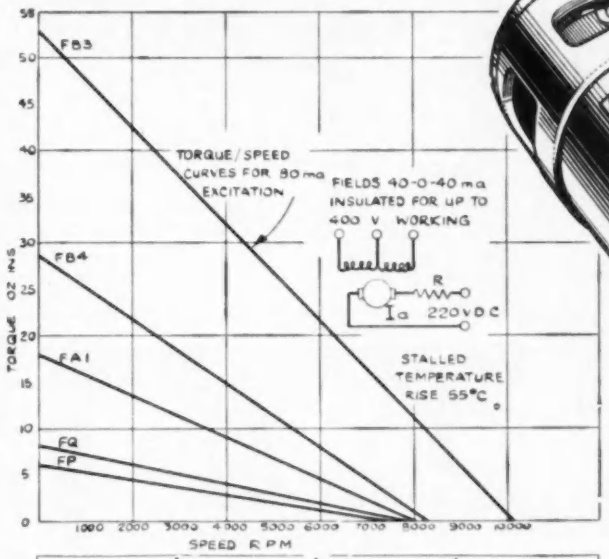

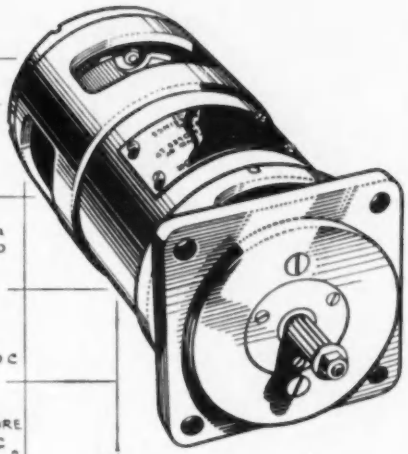

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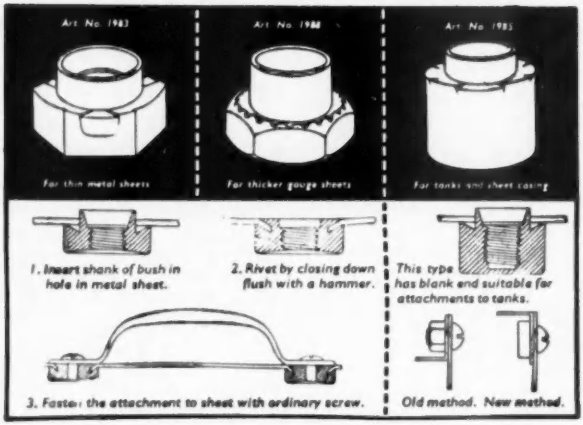
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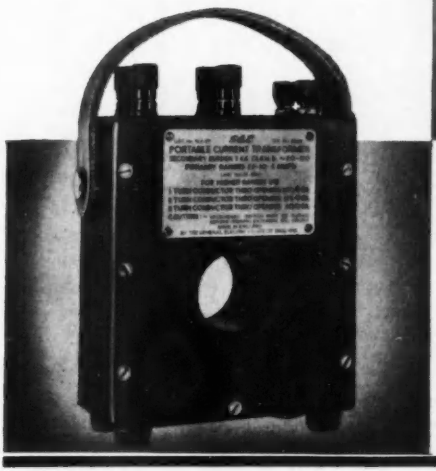

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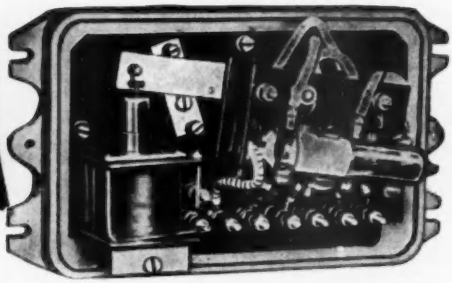

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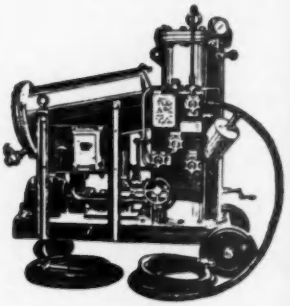

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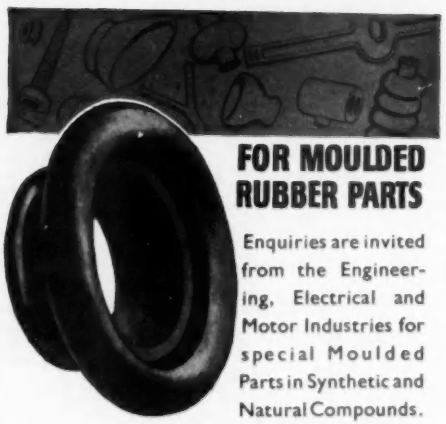

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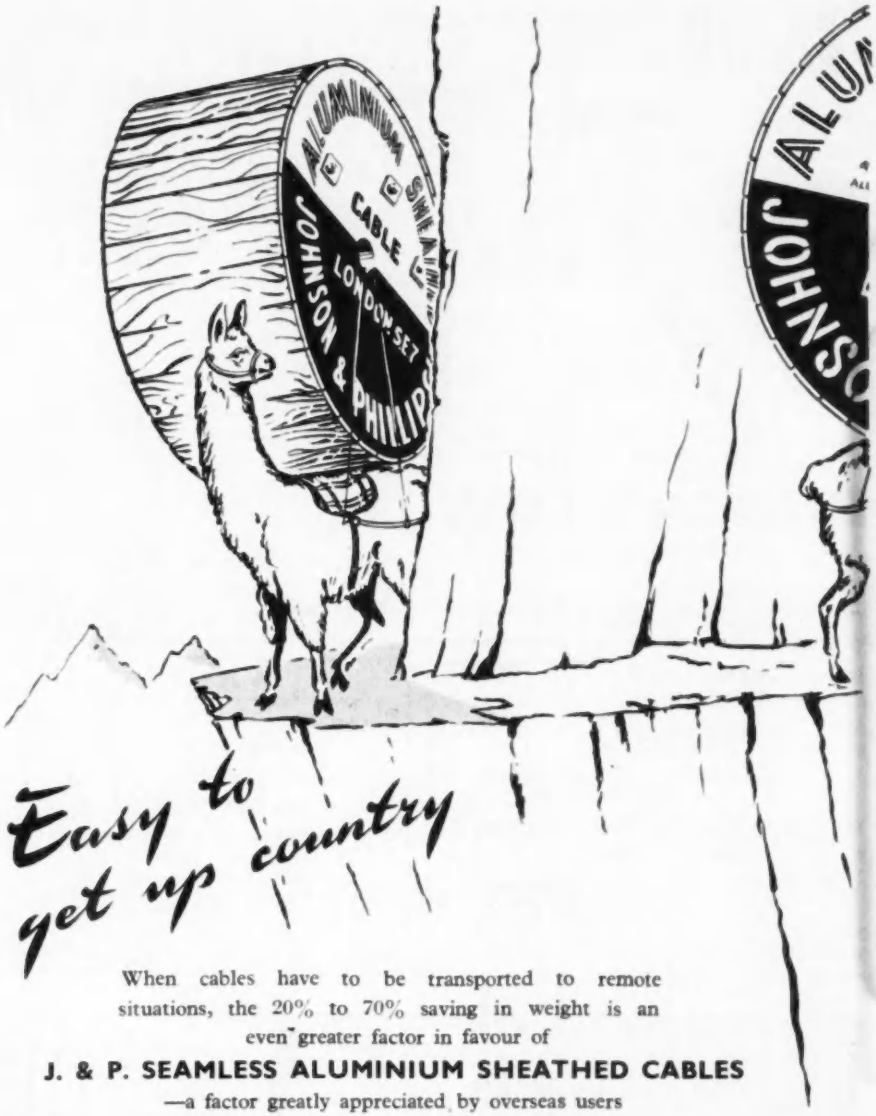

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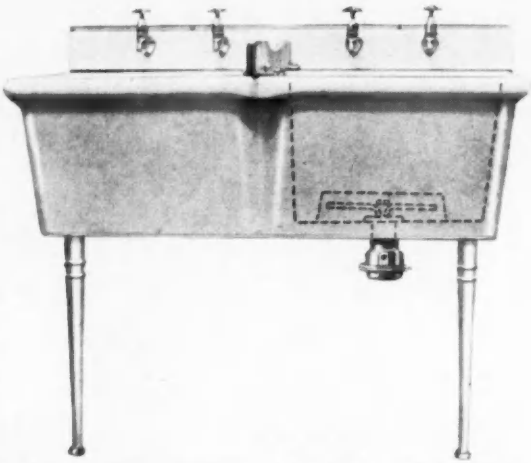

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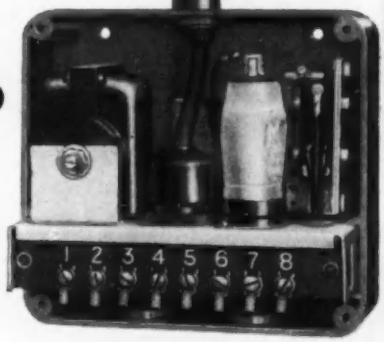

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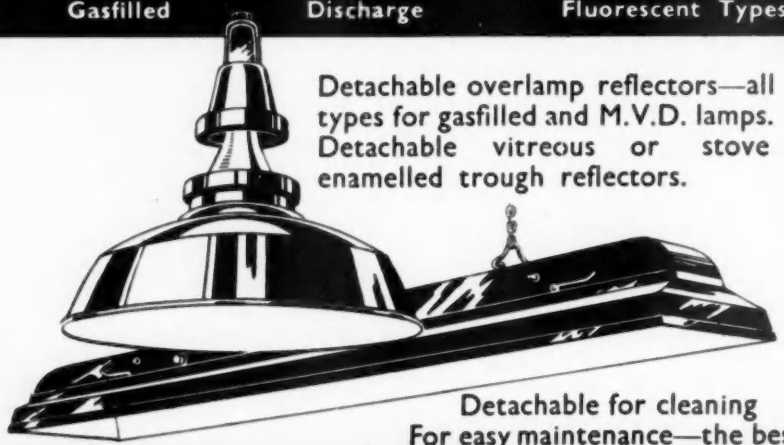

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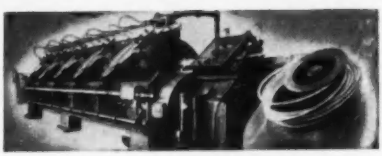

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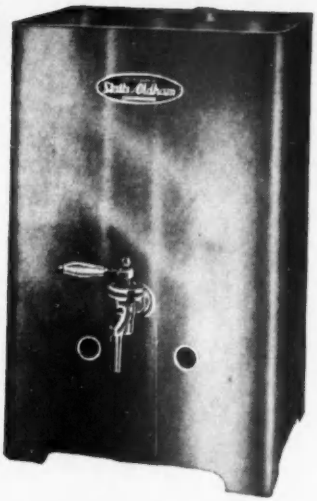

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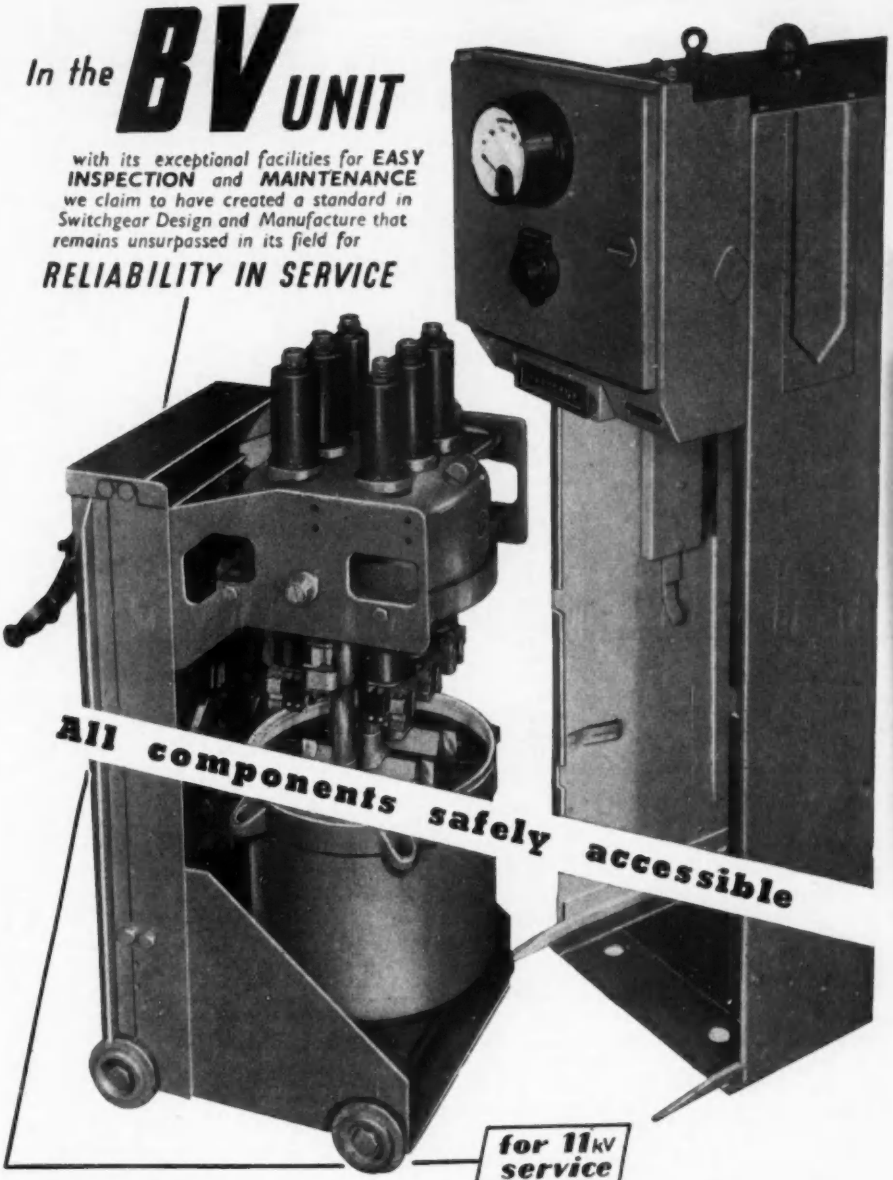

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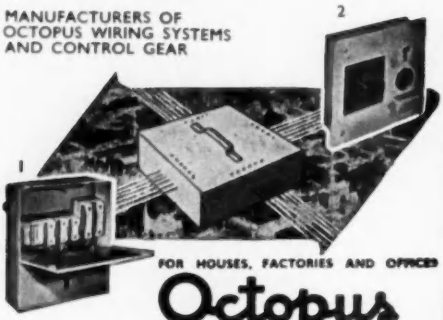

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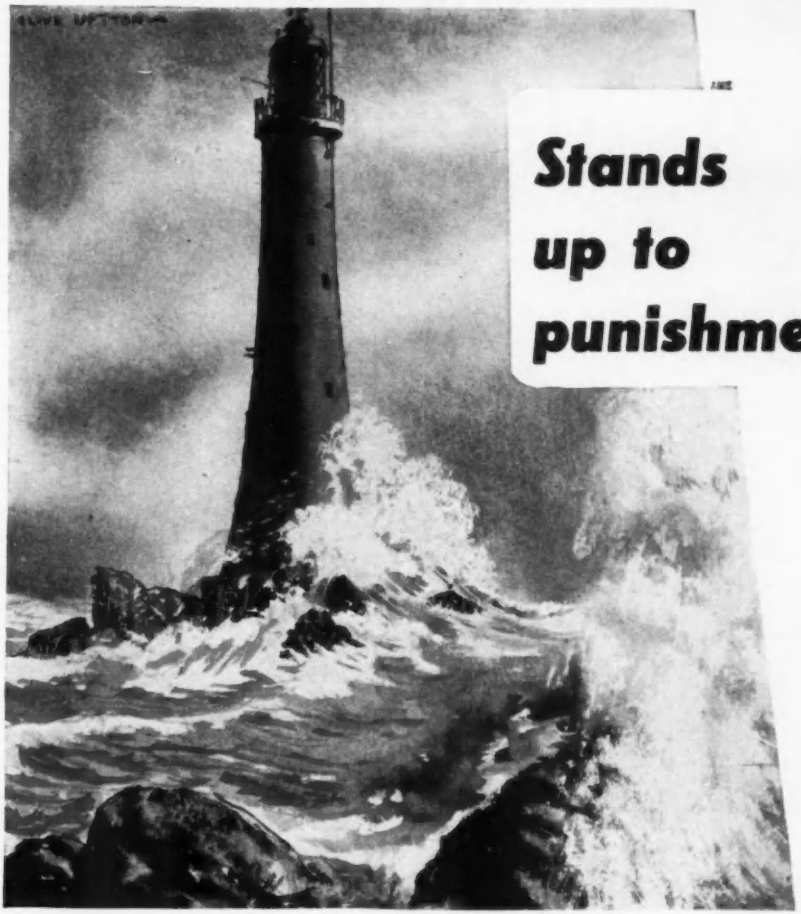

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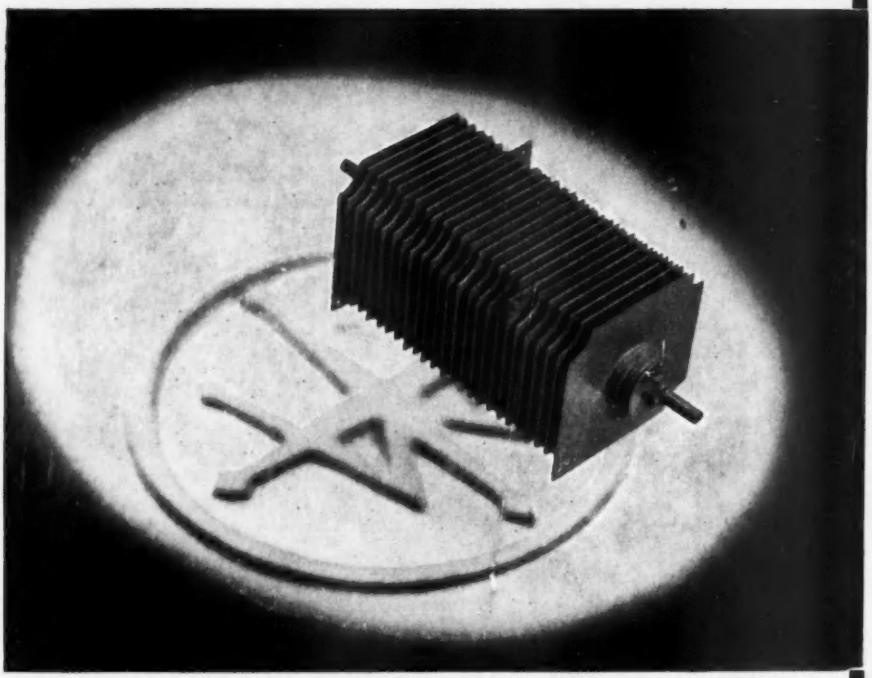

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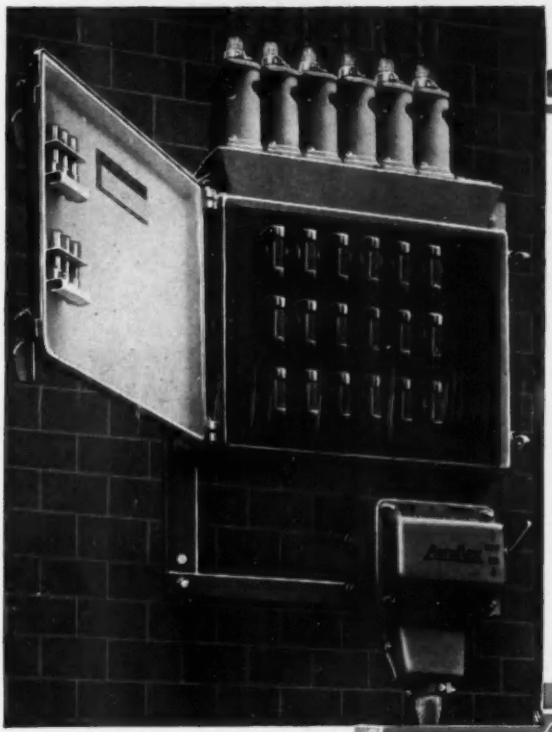

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